6
F221
Cop. 2

LIBRARY
RECEIVED
JAN 1943
U.S. Department of Agriculture

FARMERS DIGEST

JANUARY, 1943

Volume 6
Number 8

25c a Copy
$2.00 a Year

Better Breeding Reduces Milk Costs ..... *American Dairyman* 1
Low-Cost Nitrogen ..... *Farm Journal and Farmer's Wife* 5
Home Grown Heat ..... *Wisconsin Agriculturist and Farmer* 8
More Profit from Sheep on Range ..... *Western Farm Life* 10
Profit or Loss in the Cattle Business ..... *Nebraska Farmer* 13
A Triumph for Turkey Tenancy ..... *Southern Planter* 16
Nutrient Quality of the Soil ..... *Soil Conservation* 20
A Believer in Grass ..... *Successful Farming* 22
Halt Stream Bank Erosion ..... *Ohio Farmer* 25
100 Bushels of Corn on Old Land ..... *Farm and Ranch* 27
More Chicks Per Hen ..... *Poultry Tribune* 29
Manure Yields Profits ..... *Dakota Farmer* 32
Farm Machines Fight for America ..... *Nation's Business* 33
Maintaining the Farm Flock ..... *Sheep Breeder* 37
How to Buy a Farm ..... *Southern Agriculturist* 43
Take Care of Your Machinery ..... *Ohio Farm Bureau News* 45
Good Cow Air Saves Barns ..... *Electricity on the Farm* 47
Proteins, Minerals, Vitamins for Reproduction ..... *Jersey Bulletin* 51
An Opportunity for Poultrymen ..... *American Poultry Journal* 56
Pruning Abandoned Fruit Trees ..... *California Cultivator* 59
Clover Pastures for the Coastal Plains ..... *Better Crops* 61
Cattle Hides—a War Commodity ..... *The Cattleman* 67
Jacks and Mules ..... *Rural New-Yorker* 71
Hemp—Our Forgotten Crop ..... *Missouri Ruralist* 75
Benefits from 4H Club Work ..... *Vernon Pellet* 77
Copra ..... *Pennsylvania Farmer* 79
Milking Machine Sanitation ..... *American Agriculturist* 82
Wheat is Good Feed ..... *The Farmer* 83
For the Farmer's Library 85

The Farmer's Digest

Editorial Staff:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer

Business Manager—A. E. Heick

Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

Advisory Editorial Staff:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest

Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*

2 Years $3.50 *3 Years $5.00*

Foreign and Canadian Subscripions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1937, under act of March 3, 1879

The Farmer's Digest

Volume 6 January, 1943 Number 8

Better Breeding Reduces Milk Production Costs

Condensed from American Dairyman

Dr. O. E. Reed
Chief of the U. S. Bureau of Dairy Industry

ABOUT 26 million cows are milked on the farms throughout the United States. They are said to be kept for milking purposes, but on the great majority of farms the cows are really kept to provide a market outlet for the feed the farmer raises. Crop and feed production is the primary consideration on most of these farms, and the kind of cow used to turn the feed into milk is given only secondary consideration as a rule. In thousands of instances, the farmer would be better off from a cash standpoint if he sold his crops outright. The reason is that the average cow-milking farmer does not keep the right kind of cows. Many cows do not produce enough milk to pay for the feed they use; others may pay for the feed, but fail to pay a fair return for the labor and overhead involved.

Figures from the dairy herd-improvement associations in 1940 showed that the cows that averaged only 4,500 pounds of milk a year (which is the same as the average for all cows milked in the United States) consumed $1.11 worth of feed for each hundred pounds of milk they produced. Feed is usually considered only half the cost, so if we add to the cost of feed, another $1.11 to take care of the labor and overhead, it would cost $2.22 to produce 100 pounds of milk with such cows. Cows that do no better than that are not the most efficient milk-producing machines for the farmer to use as an outlet for his feed and labor. Yet such cows represent the standard of efficiency for the great mass of cows that are called upon to furnish our national milk supply, at a profit to the farmer.

For example, about 31,000

Reprinted by permission from the American Dairyman, Chicago, Ill., Feb., 1942

dairy farmers have enrolled their herds in the dairy herd-improvement associations in the 48 States. They are the farmers who are at least trying to improve the efficiency of their cows. In 1940, the cows in these association herds averaged about 8,100 pounds of milk a year. On the average, these cows made 100 pounds of milk from each 80 cents worth of feed they consumed. That represents a reduction of 31 cents on 100 pounds of milk, a reduction in feed cost alone, obtained by using cows that produce 8,100 pounds of milk a year instead of cows that produce only 4,500 pounds.

If the farmers of the United States are to produce milk cheaper, many thousands of them will need to provide themselves with higher-producing cows than they are now using.

The farmers throughout the nation as a whole, save between 5 and 6 million heifer calves each year and raise them for replacements in their herds. Evidence from the testing and record-keeping associations indicates that at least one-third of these heifer calves turn out to be unprofitable producing cows, that another third are only able to break even, and that only a third may be expected to be profitable to keep. Raising 3 heifers to producing age to get one good one is one of the farmer's biggest expenses, and this must also be charged against his cost of producing milk.

A farmer could, of course, assemble a herd of high-producing cows but unless he were lucky in selecting a herd sire, or followed a more scientific method in selecting his bull than most farmers, his very next crop of heifers would pull down the average of his herd.

Fortunately, the breeding experiments conducted by the Bureau of Dairy Industry over the past 22 years now point the way to breeding methods that will gradually reduce the percentage of low-producing females born in the herd.

We have been using proved sires in our experimental herds ever since the breeding investigations were planned and started 21 years ago. We believe that our results, both with Jerseys and Holsteins at Beltsville and at our other field stations, amply demonstrate the theory that it is possible to build up the inheritance for high-producing capacity in a herd by using an unbroken succession of good proved sires.

In the Jersey herd, we started with selected foundation cows that had an average production of 11,626 pounds of milk and 622 pounds of butterfat (mature-equivalent basis). During the 22 years, we have used nine proved sires and today the herd is made

up of the unselected female descendants of the foundation cows and these proved sires. There are 48 females in the herd that are old enough to have records, and they average 13,762 pounds of milk and 753 pounds of butterfat (mature-equivalent basis). This represents an increase of 2,156 pounds of milk and 131 pounds of butterfat per cow over the foundation herd. It has been brought about entirely through breeding; that is, without the benefit of culling or of improving the feeding and management conditions throughout the 22 years.

In the Holstein herd, the foundation cows had an average production of 19,966 pounds of milk and 678 pounds of butterfat. Five proved sires have been used in this herd. Today the herd is made up of 45 unselected female descendants (outbred and line bred) of the foundation cows and these five proved sires that average 20,179 pounds of milk and 801 pounds of butterfat, an increase of 213 pounds of milk and 123 pounds of butterfat that can be attributed entirely to the breeding program.

In these experimental herds, where only sires of proved merit have been used, few low-producing females have appeared among the offspring and their number has gradually diminished with each succeeding generation of proved-sire matings. The average production of the 95 females born in the Jersey herd during the course of the experiment was 701 pounds of butterfat (mature basis), but only 23 of the 95 were below 600 pounds. The average production of the 106 females born in the Holstein herd was 719 pounds of butterfat (mature basis), but only 16 of the 106 produced less than 600 pounds.

The real objective of the proved-sire system of breeding is not merely to raise the level of production in a herd, but rather to "purify" the germ plasm to such an extent that fewer and fewer offspring will have low-production inheritance. When a herd reaches that stage, the owner will have eliminated one of the most costly features of maintaining a milk producing herd—the cost of raising 3 heifers to producing age in order to have 1 good one in his herd.

Furthermore, the young bulls born in herds where only sires of proved merit have been used, will carry the same desirable inheritance as the heifers. Such herds are a better source of young untried bulls for the average dairy farmer than herds where sires of unknown transmitting ability have been used.

The bull-loaning and proving part of our experimental work has served to demonstrate the fact that young untried bulls from herds where good proved

sires have been used continuously are more dependable than untried bulls from herds of unknown genetic make-up. The average dairy farmer looking for a young bull will do well to buy from breeders who follow the proved-sire system to build up the production inheritance of their breeding stock.

Rapid developments in the technique of artificial insemination have also opened up new opportunities in developing better herds. Both the Bureau's research work with artificial insemination, and practical experience, indicate that this is one of the most promising means of spreading the influence of good sires to a large number of herds.

Good proved sires are scarce and, as a rule, they have only a few years of active usefulness after they are old enough to be proved. Among the 3,000 sires proved during the past year, less than half were good enough to raise the production level of the herd in which they had been used, and only 15 per cent were still alive at the time they were proved.

To speed up the improvement of the Nation's dairy cattle, therefore, it is imperative that we locate as many outstanding sires as possible and make every effort to use them and their sons to the fullest extent. We are greatly encouraged by the interest shown by the progressive dairy cattle breeders and dairy farmers in helping promote the sire proving program.

I feel confident that the selection and use of proved sires is the greatest forward step the dairy industry has taken in many years, and that the wide applica- of the proved-sire system of breeding will accomplish more permanent good in the way of reducing cost of milk production than any other program now in sight for the industry.

Low-Cost Nitrogen

Condensed from Farm Journal and Farmer's Wife

BECAUSE chemical nitrogen is needed for munitions, war regulations now govern its use in fertilizers.

These restrictions have the effect of putting a bigger dollar sign than ever on farm manure, because it is an important source of nitrogen if handled so as to prevent plant-food losses.

An average ton of farm manure contains about ten pounds of nitrogen, five pounds of phosphoric acid, and ten pounds of potash. The amount of manure produced annually per 1,000 pounds of liveweight is about 15 tons by cows, 12 tons by horses, 10 tons by sheep or fattening cattle, 18 tons by hogs, and 4.2 tons by chickens.

Sheep and chicken manure may be twice as high in nitrogen content as that from hogs or cattle. In the case of cattle and sheep, about one-half the nitrogen is in the urine.

There is about as much nitrogen in four or five tons of average farm manure as there is in 250 pounds of nitrate of soda. Besides nitrogen, the four or five tons carry about as much phosphoric acid as 100 pounds of 20% superphosphate, and about as much potash as 80 pounds of 50% muriate of potash.

Put 300 pounds of 20% superphosphate with four or five tons of average farm manure, to build up more phosphoric acid, and you get as much of the three plant food elements as there is in a half-ton of 4-8-4 fertilizer. Farm manure can be plowed under or used as a top-dressing for small grains.

Valuable as farm manure is, nobody can write or talk about it for long without coming around to the tremendous waste of plant food resulting from poor care and wrong handling. In a month or two, a pile of manure allowed to heat or left exposed to rain will lose about half its nitrogen and potash.

Several times as much nitrogen is lost through poor handling of farm manure as is purchased in fertilizer. The most serious losses on farms occur when the liquid portion of the manure is allowed to get away through lack of enough bedding, fermentation, and escape of nitrogen into the air as ammonia.

When manure has to be re-

Reprinted by permission from the Farm Journal and Farmer's Wife, Philadelphia, Pa., Dec., 1942

moved from the barn regularly (as on dairy farms, where sanitation requires removal), the best method of handling is to clean the barn into the spreader and distribute the manure evenly each day. So handled, the manure does not heat, and the leachings from rain or melting snow go into the field soil for use by crops.

In bad weather, or when the field is too soft, or when a growing crop prevents spreading, put the daily removals in a covered pit or shed until the manure can be spread. If daily cleaning is not required, the manure can be preserved in the shed by adding enough bedding daily to keep the animals clean and to absorb the liquid. Packing by the animals' feet prevents heating and loss of nitrogen into the air.

Adding superphosphate not only makes fresh manure a better-balanced plant food; it also retards fermentation and helps to lock the nitrogen in. Addition can be in the gutter, floor pens, dropping boards in poultry houses, feeding sheds, or over the manure pile or spreader load.

Because of the rapid loss of nitrogen in the form of ammonia, the sooner superphosphate is added, the more nitrogen is saved. Use one to one and one-half pounds every day for each cow, steer, or horse; one-third of a pound daily for each hog, or sheep; one pound for each 100 hens. When superphosphate is not used in the stable, 50 to 75 pounds should be spread on each load of manure.

Land that is to be plowed immediately offers the most efficient use of manure. Where there are limited amounts, it is best applied at half the usual rate in order to cover more land. Fertilizer applications with the new crop can help to make up the difference.

Old sod that has no clover left can thus be manured, fertilized, and seeded to a suitable grazing crop and then top-dressed naturally by grazing animals. If no cropland is available, manure should go on pasture land after it has been grazed off.

Dragging pastures to scatter droppings should take place after grazing. The plant food leached out will be absorbed and used by the grass. Livestock should be on pasture or grazing crops rather than in the lane, dry lot, or around water holes where the manure may be lost.

The latest word in saving liquid manure is the manure cistern, used by quite a few dairymen in the Pacific Northwest, and coming into use on large dairy farms farther east. The cistern (an underground tank of concrete or matched fir planks) is used to catch the urine and drippings from cows in the milking barn. By use of a hose when

cleaning the barn, manure is literally washed down the gutters into the tank.

The cisterns are built large; they are emptied only once every few weeks—sometimes not that often. Some of the tanks are built into a hillside, so they can be emptied by gravity. The liquid manure is drawn off into tank wagon spreaders. At the rear end of the spreader is a valve to let the liquid out on a spreading device.

On farms where absence of slope prevents emptying the pit by gravity, or where the owner wants to do the job with machinery, a pump is used to take the liquid manure out of the cistern and put it into the tank wagon. In some of the cisterns, a motor-driven pump re-circulates the heavy liquid before delivering it to the tank wagon; in others, the stirring is done by hand with a piece of 2" x 4" lumber on the end of a long piece of pipe, or a large wooden rake. To prevent settling in the tank wagon, an agitator is used.

Used on pastures in the state of Washington, good results have been secured from liquid manure spread from tank wagons. The Washington Experiment Station reports a series of pasture trials in which manure was diluted with about ten times its volume of water as a result of washing the manure into the cistern.

The liquid material was applied at the rate of 86 tons per acre per year on bottom land muck-soil pasture, grazed rotationally. Each treated plot received an application of liquid manure as soon as the cows had grazed it off each time. It was about 18 to 21 days between applications. There was no scalding of the grass, and its palatability was not affected. Outcome of the trials (lasting four years) was as follows:

Amount of protein in the treated pasture was only slightly higher than in untreated pasture alongside. There was, however, an increase in total digestible nutrients of 484 pounds per acre on the treated pasture. This is about equal in feeding value to one-half ton of good alfalfa hay.

"The extra 484 pounds of digestible nutrients when used by a cow for milk production would produce about 1,500 pounds of 4 per cent milk," says the official report of these trials.

Home-Grown Heat

Condensed from Wisconsin Agriculturist and Farmer

IN this war year, coal and fuel oil are precious. They are vital to defense and war-time needs. For this reason, it is even more important than ever that farm homes and rural village homes be supplied with winter fuel in the form of wood.

A cord of seasoned oak, elm, hard maple or hickory wood has practically the same heating value as a ton of good coal, or 200 gallons of ordinary fuel oil. Even light pine, cedar, basswood and poplar will furnish more than half that heating energy.

Armament manufacturers know that it requires more than a ton of coal to make a ton of steel for a cannon, a tank or a warship. Increasing quantities of coal and oil must be used during the next few months. Every ton of this fuel that can be saved is that much added to the war effort. Every cord of wood that is used to replace a ton of coal brings us that much nearer to VICTORY.

The crop of wood that is harvested carefully takes but little toll from the millions of acres of wooded lands still growing in most of our States. On thousands of farms, only dead trees are cut out each year. This leaves the growing tree crop in even better condition for healthy growth and expansion.

Lightning-struck trees, windfalls and crowded clumps from the average ten-acre wood lot will furnish fuel for farm use, besides a few cords to sell, without drawing seriously from the crop of healthy growing trees. The tree lot is kept intact and suffers no robbery, by this plan.

Most farmers know that a cord of green oak or hickory weighs over 5,000 pounds, but loses 1,000 to 1,500 pounds when dry. The actual heating value is reduced as much as one-sixth when some of the green woods are burned for fuel.

A lot depends upon good firing. If care is taken, much more heat and much less waste of fuel will result. Wood can be burned in a coal burning furnace, if draft openings are kept smaller than for coal, but a mixture of wood and coal may be most satisfactory when the furnace is large. In that case, the plan is to fire with wood until a good bed is laid, then banking with a layer of coals.

Seasoned wood will cause less deposit of creosote in pipes and chimneys. This sooty liquid is a source of much trouble. One of

Reprinted by permission from the Wisconsin Agriculturist and Farmer, Racine, Wisconsin, Nov. 14, 1942

the points in checking creosote deposit is good draft. The chimney should be high enough to provide good draft. An additional foot or two added to height sometimes solves this difficulty. Checking fires too much will add to this trouble, particularly when green wood is burned. The vapor from the firebox then condenses on the inside of chimney and pipes in such quantities that the black creosote forms in layers, sometimes even running down the wall below.

If dry wood is burned and the draft kept drawing, little of this trouble is found. The closing of draft dampers and check draft for the night accounts for much of the trouble with soot and creosote.

For best combustion, wood should not be stacked high in the furnace above the level of the smoke pipe. Better consumption of gases is secured when most of the air is let in from draft openings above the fire. If green wood must be used, a small hot fire will give best results and leave less of the black, sooty deposit. Try to save some dry sticks for starting, so that there will be less smolder smoke.

Markets for fuel wood have not been well organized in some sections, but owners of wood lots usually are known, or can be located. In the present emergency it will be helpful if more wood is bought and sold for fuel.

Every shipload of coal and every tank of oil saved will be a unit of defense as important as armament and food for our fighting forces.

Cow Ration Changes

Some experiments at Cornell show that so long as the ration contains the things they need, cows are not at all particular as to what feeds make up the ration. Neither did they register any objection in the way of decreased production when overnight changes were made in their rations.

This information is important. Where home-grown grains are produced, a dairyman need have no hesitation in using them in his cow ration. These home-grown grains can be balanced either by buying high-protein ingredients, plus the necessary minerals, or a high-protein supplemental mixture. Furthermore, the protein supplements purchased can be bought on the basis of cost per pound of digestible nutrients; and if the price situation changes, the kind of high-protein supplement bought can be changed without hesitation.

—*American Agriculturist*

More Profit with Sheep on Range

Condensed from The Western Farm Life

Clyde W. Doran

Rocky Mountain Forest and Range Experiment Station

WOOL growers engaged in producing range lambs have long been aware of the benefits and increased income resulting from careful culling of the breeding herd, from proper handling of flocks during the lambing season, and from proper feeding and conditioning of ewes prior to lambing.

In the present world crisis, when wool and mutton are so important to national defense, these practices must be emphasized and every effort should be made to apply them as effectively as possible. In addition to these breeding and lambing practices, management of the sheep on the range, particularly during the summer, is extremely important in the production of lambs and, as such, deserves special attention by every range user.

Obviously, many factors affect the growth and condition of lambs during the summer, and some of the most important of these involving range management have been evaluated by a study in western Colorado. Conducted over a 3-year period by the Rocky Mountain Forest and Range Experiment Station, it was learned that death losses may be greatly decreased, and lamb weights and resulting income correspondingly increased by careful management on the range.

Two bands of sheep grazing adjacent national forest allotments were studied. Each, composed of approximately 1,000 ewes with lambs, had suffered severe losses from poisoning and straying in the past. Both allotments supported scattered stands of orange sneezeweed which is poisonous to sheep. Bear and coyotes were present on the area, and the country was rough and timbered, making it difficult to avoid straying.

One of the bands was poorly managed during the first year of study. Bedgrounds were used excessively, several being used from five to seven nights in succession. The sheep were bedded at the main camp, which was seldom moved, necessitating long drives to and from the bedground each night and morning to reach fresh feed.

These practices were caused by a lack of co-operation among the

Reprinted by permission from Western Farm Life, Denver, Col., Oct. 15, 1942

owner, camp-mover and herder. The owner did not furnish the herder with a teepee and horse so the sheep could be bedded out. The camp-mover was lax in moving the main camp, and the herder soon lost interest in good management of any kind. The sheep were often allowed to remain on the bedgrounds for some time after dawn or were permitted to return early in the evening. They spent an average of 2 hours a day idling on the bedgrounds—time which should have been spent grazing.

The band was closely herded and not allowed to spread out and graze leisurely and quietly. Dogs were used excessively in herding and the sheep were nervous and easily frightened. Individuals or small groups of sheep would often travel great distances at the slightest provocation and become lost and easy prey for coyotes or other predators.

This band was permitted to concentrate along drainages or other easily accessible places, while less accessible areas remained untouched. The scarcity of forage, resulting from excessive use of some areas, caused many sheep to be lost, while straying in search of other feed.

Sneezeweed was heavily grazed with resulting death loss from poisoning. This plant is not eaten by sheep to any great extent, if other palatable forage is abundant. But when areas supporting the plant are used for bedgrounds, for "shading up," or when the sheep are most hungry, it is heavily utilized.

A total death loss of 174 animals, or 8.7 per cent of the band, resulted from this poor management. Of these, 120 were lambs. Lambs averaged only 66.8 pounds when shipped to market, and the gross income received from the sale of lambs was $5,878.

The following year, the management of this band improved the first part of the season. More bedgrounds were used for only one night. Sheep were herded more openly and with less use of dogs. The herder was given a horse and teepee and a bedding out system was used. A much more uniform use of the range was apparent.

However, during the latter part of the season, the herder became slack in applying the better management practices and gradually drifted back to the poor handling practices so prevalent the year before. When management relaxed, the utilization of sneezeweed increased immediately and local areas were tramped excessively. Thus the management for the entire grazing season, although improved, could only be classed as fair.

A total death loss of 99 animals, or 4.9 per cent of the band, resulted from this fair manage-

ment. Of these, 63 were lambs. Lambs averaged 67.1 pounds when shipped to market, and the gross income received from the sale of lambs was $6,287. These comparative figures on death losses and income were computed on an equal basis: 1,000 ewes and 1,000 lambs entering the study allotments each year, and the same market price was received for both bands in all years.

In the third and last year of the study, this band of sheep was well managed throughout the season. More than 70 per cent of the bedgrounds were used for only one night. Open quiet herding with slight use of dogs, uniform use of the range with no concentration along drainages or on local "sore" spots, avoidance of sneezeweed stands when bedding or "shading up," and full cooperation on the part of the herders, owners, and camp-movers, combined to greatly improve the management with little or no increase in operating costs.

Under this good management a total death loss of only 38 animals, or 1.9 per cent of the band, resulted. Nineteen of these were lambs. The lambs averaged 76.5 pounds when shipped, and the gross income received from sale of lambs was $7,505.

Results Confirmed

By improving the management of this band over a 3-year period, death losses were decreased from 8.7 to 1.9 per cent, 101 more lambs were marketed, the weight of each lamb produced was increased an average of 9.7 pounds, and gross income was increased more than 27 per cent, or $1,627 on 1,000 lambs.

The other band of sheep revealed similar trends, although differences in the management practices were not so pronounced. The poorest management was practiced on this band during the second year of the study and resulted in a total death loss of 135 animals or 6.7 per cent, 75 of which were lambs. Lambs averaged 67.5 pounds when shipped to market, and the gross income received from the sale of the lambs was $6,244.

Much better management was practiced the first year, and a death loss of only 83 animals occurred, or 4.15 per cent of the band, 46 of which were lambs. Lambs in this year averaged 75 pounds when shipped, and yielded a gross income of $7,155.

Here again it is evident that good management pays dividends. Under improved management death losses were lower and lamb weights higher. Gross income increased approximately 15 per cent or $911.

This study has shown the relation of production to management.

Profit or Loss in the Cattle Business

Condensed from The Nebraska Farmer

Ellen Roemer

THE difference between good pastures and poor, fat cattle and lean, money in the cattleman's pocket or a mortgage on the old homestead depends upon several factors, and one of these factors is range management.

A practical answer as to just what kind of range management will contribute to tipping the scales on the favorable side is being sought by the United States Department of Agriculture thru the Forest Service, which has large areas of range land under its direction. Of the several test areas in the West, the one which can answer the most questions for Nebraska cattlemen is the Central Plains Experimental Range near Nunn in Northeastern Colorado. This 13,000-acre range is a field branch of the Rocky Mountain Forest and Range Experiment Station, maintained by the Forest Service at Colorado State College in Fort Collins. The Soil Conservation Service is also cooperating in the project.

The cattle used in the experiments near Nunn are furnished by members of the Crow Valley Cooperative Livestock association. They are sent to the range as yearlings, are returned to their owners for the winter, and some of these yearlings are sent back to the range as two-year-olds. Cows and calves are also used in the experiments. There are plenty of cattle to make really good tests of each experiment and the pastures, averaging a half section each, are not handkerchief-sized plots, but real ranges.

Results of heavy, conservative, and light grazing over six-month periods have been studied. "Heavy" grazing is obtained with long yearlings by grazing at the approximate rate of 15 acres per animal; "conservative," 20 acres; and "light," 26 acres. The average gain over the six-month summer grazing period for a yearling Hereford on a heavily used pasture is 185 to 250 pounds; on a conservatively used pasture, 300 to 320 pounds; and on a lightly grazed pasture, 320 to 350 pounds.

Without exception, ranges subjected to heavy grazing deteriorated in forage value; grass thinned out and such undesirable weeds as thistle, peppergrass and even cactus gained a foot-hold. Conservatively grazed pastures

Reprinted by permission from The Nebraska Farmer, Oct. 17, 1942

about doubled in density and amount of grass. No pastures have been re-seeded during the experiments and better management has been the only method of improving the native pastures, which are predominantly blue grama and buffalo grass.

The men conducting the experiment concluded that conservative grazing would put the most money in cattlemen's pockets. Light grazing puts a little more weight on each animal, but not enough to make up for the smaller number of animals pastured. Heavy grazing for one or two years may result in total beef production equal to that of conservative grazing but the poor quality animals and the resulting range depletion make this practice uneconomical. To be exact, conservative grazing on an average pasture means that approximately 17 animals are grazed on 320 acres. The average gain of 310 pounds per animal adds up to a total gain of 5,270 pounds. On a lightly grazed range of the same area, only 12 animals are grazed. Though a heavier gain of 330 pounds per animal is made, the total beef production is only 3,960 pounds. On heavily grazed pastures with 22 animals showing gains, approximately 230 pounds on the average, a total production of 5,060 pounds is obtained.

Men working on the experiments have noted that animals which are better fed, perhaps getting some cotton seed cake, during the winter, sometimes make a smaller gain on pasture the following year than do cattle which have been wintered on stubble and the like. However, the flesh is better quality.

Such observations are accurately checked, for each animal is ear-tagged and weighed twice at the beginning and twice at the end of the six-month period and once each month in between.

Seasonal trends in grazing have also been studied on the experimental range. The average gain of cattle in May is about 80 pounds; in June, 75 pounds; July, 60 pounds; August, 35 pounds; September, 30 pounds; and October, a small gain and sometimes a loss of weight.

This indicates that late grazing may be unprofitable. Following frost, cattle may not only gain no weight or suffer losses in weight, but they may injure the grass. This observation has been checked over a four-year period on the range near Nunn and similar observations come from experimental ranges elsewhere. The loss is attributed to the leaching of the grasses and loss of vitamins, which are important to cattle as well as to human beings.

Though a glance at an overgrazed pasture then at a conservatively grazed pasture is enough

to prove the experimenter's statements about grass conditions, the experimenters themselves check more scientifically on forage conditions and values. At intervals, 25 square foot areas are clipped for analysis of forage production and utilization. Chemical analyses are obtained for the purpose of determining feed value of the forage.

These guides to good range management are especially important during war-time, when increased meat production is vital. It is much more economical for the individual cattleman and for the nation as a whole to increase meat production by greater gains per animal and more calves per cow than to increase beef herds. This prevents a too greatly increased capital investment in larger number of livestock and also prevents over-utilization of the range.

From the results on the Central Plains Experimental Range, the recommendation for getting more weight per animal is conservative grazing and proper seasonal use of ranges. Besides meeting present critical conditions, this system has the advantage of building good ranges for future years.

Regarding seasonal use of ranges, Mr. Costello says, "Proper seasonal use should be observed from the standpoint of both the range and the animals. If forage is grazed too early, damage results to the range, and if animals are allowed to remain on the range until late fall, serious shrinkage in weight way occur."

Mr. Costello knows whereof he speaks when he talks about improved calf crops. In five years, the calf crops on the area adjoining the Central Plains Experimental Range have been improved from 55 to 88 percent. The reasons, Mr. Costello says, are more culling of dry cows, use of better bulls and improved range management methods.

The economy of larger calf crops is explicitly pointed out in Mr. Costello's statement:

"For a given amount of beef production, a maximum calf crop requires fewer animals in the herd, a smaller capital investment, less work and a decreased amount of feed. A 100 percent calf crop requires 1½ years of feed for each cow that weans a calf. (Feed necessary for the cow herself, the bulls and the calf is included in this figure.) A 50 percent calf crop requires 3 cow years of feed to produce the same weaner calf. Not less than a 90 percent calf crop should be the goal on every ranch."

A Triumph for Turkey Tenancy

Condensed from The Southern Planter

Chas. W. Wampler

THIS is another story of the farm family that did the simple, everyday tasks of life just a little bit better and made a big success. It is the story of Mr. and Mrs. Charles W. Wampler and their nine children, of Rockingham County, Virginia, whose efforts this year produced 107,133 turkeys and over 500,000 broilers.

"The first money I ever made in my life," Mr. Wampler will tell you, "was 7 cents my mother gave me for finding a turkey's nest. I spent 2 cents for candy and saved the nickel. That was fully 50 years ago, but it marks my first interest in turkeys as money-makers."

What Mr. Wampler doesn't stress about that first turkey transaction was the thrift he exhibited. That innate ability to save has stood him in good stead throughout life, and made of him the second largest turkey grower in the world and the leading turkey man in America. He has received agricultural honors from one end of the country to the other, and is now president of the National Turkey Association.

Every member of the Wampler family has a job to do, and does it right and on time.

In addition to turkeys and chickens, the Wamplers raise Aberdeen - Angus and Holstein cattle, and Cheviot sheep.

Their system of turkey production is unique. Except for the 20,000 to 25,000 produced by the Wampler family, all of the turkeys are raised on a share-crop arrangement by good farmers within a radius of 50 miles around Harrisonburg—most of the flocks being within 10 miles. The tenant arrangement is about as follows: Mr. Wampler furnishes the poults, feed, fuel, litter, supervision and does the selling. The landowner supplies the range, equipment and does all the work. When the turkeys are marketed in the fall, they are weighed and sold at the farm. The landowner gets 5 per cent of the gross sales value, plus 60 per cent of the profits after the cost of poults, feed, fuel and litter has been deducted. There are 74 farmers working with the Wamplers under this plan. While the number of birds per farm varies, 2,000

Reprinted by permission from The Southern Planter, Richmond, Virginia, Nov., 1942

are about all one man and his family can handle on a small place.

This arrangement has many advantages. It affords Mr. Wampler an outlet for his poults and feeds; it enables the other party to use his surplus hours in profitable work, to build up his soil fertility and take advantage of the Wamplers' expert knowledge of turkey production. Ruth Wampler, who pioneered modern turkey production in Virginia as a 4-H Club girl, works closely with all of the growers and gives them the benefit of the family's long experience with turkeys.

"As far as I have been able to learn," Mr. Wampler warns, "this method has usually failed and will no doubt continue to fail in most sections. In order to make a success of a project of this kind, the person doing it must have at least a fairly good insight into the production and hatching of baby turkeys, know the feed business, know the marketing and, above all, he must know the people with whom he is dealing. They should also know him and have confidence in him.

"We here in Rockingham are very fortunate in having an exceptionally fine group of people with whom to work."

Over a half-million broiler chicks are put out on shares each year under a similar plan. But the settlement agreement with the chickens is different, because a grower can turn out 3 or 4 batches of broilers in a year. With the chickens the landowner gets 75 per cent of the profits as his share of the venture.

Mr. Wampler keeps 6,000 turkey hens for layers. They are mated by December 1, 50 hens and 6 toms in each flock, and penned on bluegrass or rye pasture along the southwest edges of wooded areas. The breeders roost outside on 2x4 roost poles. A breeding or hatching mash, especially reinforced with vitamins and minerals, is kept before the breeders in covered hoppers. Each evening a grain mixture of yellow corn, oats, barley and wheat is fed — just what the birds will clean up in 15 to 30 minutes. Oyster-shell and grit are available at all times.

Lights are turned on the Bronze flocks at 5 o'clock a.m. (wartime), beginning January 1 to 15, and laying starts within 3 weeks. Because the Black breed normally starts laying a week earlier than the Bronze anyway, and matures a couple of weeks earlier in the fall, and because their smaller carcasses are in greatest demand on the Thanksgiving and Christmas markets, no lights are used for the Blacks.

"We have found," reveals Mr. Wampler, "that turkeys average 5 cents a pound higher around Easter-time than during the

Thanksgiving and Christmas holidays, although the volume of movement is small. We often get 25 to 30 eggs each out of turkey hens and sell them and surplus toms on this excellent Easter market for more money than they would have brought earlier. We sell 200 to 500 birds per week during this period, marketing the last of the commercial breeders by June 1."

Only the birds that have been trapnested for production records are kept a second year, and then only to determine their livability. All others are sold.

We asked Mr. Wampler what he considered a good production for a turkey hen in a season. He replied: "Without lights a good Bronze hen should lay 60 eggs, a few more with lights. We had one Black hen in our trapnesting work lay 100 eggs in 125 days. There is nothing sensational about our birds—just good turkeys that lay well, hatch well, develop quickly and make a nice profit."

The Wamplers collect the eggs carefully, incubate them by the most modern methods, and have the first batch off around March 1. A batch comes off every week thereafter.

In the meantime Ruth Wampler has lined up her cooperators, checked their labor supply, equipment and range, and delivers the poults as hatched. She returns 10 days after each delivery to inspect the project and record the number of little fellows still alive. This is the figure charged to the tenant; she absorbs the loss during the first ten days. About 60 per cent of the poults are raised in colony houses, the others in big houses with wire sun porches. They are all brooded by standard methods except, says Ruth, "We use slightly lower temperatures under the hovers and more fresh air in the brooder houses than many turkey growers. More young turkeys and chickens are killed by too much heat than by too little."

The poults get a special turkey mash, 24 to 25 per cent protein, from the start. At 10 weeks cracked corn, wheat, oats and barley feeding is begun to supplement the growing mash. Whole corn replaces cracked corn in the mixture when 4 or 5 months of age. The grain consumption increases rapidly as the nights get cool and the Bronze birds are fat and ready for market when 24 to 28 weeks old, the Black birds a little sooner.

Good pasturage for the range birds is stressed. By having so many turkeys under so many different farm conditions, the Wamplers are able to obtain some pretty accurate figures on production costs. For instance, one year they found that reasonably good grazing cut feed costs 17 per

cent; and another year, 19 per cent. Sodded range has the further advantage of reducing the disease and parasite hazard. They want their flocks to roam on clean range, where poultry has not run for 2 years or chicken manure spread during the same period.

Ruth visits the flock regularly during the season, advising on disease and parasite problems, watching management practices and feeding methods. She keeps her father posted on market conditions of the various flocks. If he wants 1,000 big, heavy toms and 500 little, well-finished hens for a special customer whose trucks are waiting, she tells him where to go and get them.

Broilers dovetail beautifully with turkey production. When the turkeys begin to feather out and go on range at 8 to 10 weeks of age, brooding equipment is thoroughly cleaned, disinfected and shifted to new yards in preparation for the broiler chicks. Chickens and turkeys never use the same range. Batches of chicks are kept running through the brooder houses continuously until turkey time arrives again in spring. This gives year around employment of equipment, buildings, range and labor—an essential of any successful poultry enterprise. The Wamplers aim to turn out a half million broilers a year on shares. From 5,000 to 15,000 broilers are sold every Monday morning.

"There are no secrets nor short-cuts to our success," Mr. Wampler emphasizes, "unless they are long hours of hard work, a lifetime of painstaking study of poultry production and marketing, and the good fortune of working with the splendid type of farmer we have here in Rockingham County."

The management genius of this man Wampler and the industry and thrift of his family have been extended, through a modified system of sharecropping, to an entire community, bringing better incomes, higher living standards and richer land to its people.

The Nutrient Quality of the Soil

Condensed from Soil Conservation

W. A. Albrecht

Chairman, Department of Soils, University of Missouri

FOR the students of soils, it is fast becoming a scientific fact that the soil controls the body, and for them it is almost axiomatic to subscribe to the theme of the day which says "Our health depends upon the soil."

The calcium, or lime, for example, makes up 1.6 percent of normal body weight, yet appears in the available form in the soil to but 0.2 percent, though much more in total. Phosphorus, the companion element for bone construction, is in the soil usually in available form to an extent of less than 0.01 percent, an exceedingly small part of a total that in itself is of no great amount. In the soil's capacity to provide these two nutrient elements liberally lies the solution to many problems in plant, animal, and human nutrition. As the lime and the phosphorus are stintingly withheld or generously offered, there is exerted a quiet force that determines the ecological pattern for plants, for animals and for humans. In its quiet and subtle way, the supply of these two nutrients alone may nourish life forms into dominance, or may reduce them to annihilation. They are the first two nutrients in importance in terms of common deficiencies.

Ten elements for plants, and twelve of them for animals, or three times the number of those of air and water origin, are drawn from the soil. The small quantity of each of them does not reduce the essentiality. Life is impossible with any one absent. It is thus in terms of absolute supply of body-building nutrients that the soil controls and directs the pattern of life. It limits life, at least, to those forms and numbers that can be maintained by the nutrient supply delivered by the soil.

We have moved plants from place to place according to the weather rather than according to the plants' requirements of nutrition. Further, when one agricultural plant variety no longer is highly productive, we search and supplant it with another only to boast of our success in produc-

Reprinted by permission from Soil Conservation, Washington, D. C., Oct., 1942

tion of tonnage of herbage. But we forget that when the first variety failed because of the declining store of soil nutrients, then the second or introduced variety that succeeds must be producing tonnage by taking relatively less from the soil. It must be making itself by taking more from air, water and sunshine, or what is above the soil. Its service to animals must then be one of providing packing for empty paunches more than of supplying soil-contributed nutrients required for animal body construction.

Short grass with high concentration of minerals and therefore rich in body-building capacities, has given us animals well developed in both skeleton and flesh and of unusual abilities and endurance. Because of the nutrients in the soil beneath them, grass species selected so regularly by both wild and domestic animals in the West have been good feed.

Here in the vegetation in all its varieties are the colors and the forms by which the Creator has painted the picture of the nutrient qualities of the soil. On that canvas is laid out the pattern by which the higher life forms dependent upon vegetation can guide their own distribution if they are to live healthily on the land.

The clay and humus are the seats of activity in exchanging nutrients. They are the jobbers and it is on them in root contact that the plant must depend for its nutrient store during the growing season. More humus and more clay, then, mean more nutrients and more rapid crop growth, provided these exchangers are not overstocked with hydrogen, or acidity, the only item the plant can offer in exchange if it is to do any "growing" business.

Any form of life in its restricted locality is a reflection of the nutrient quality of the soil. Conservation of life then depends on the conservation of the nutrient quality, or the fertility of the soil. Conservation encourages our optimism as we understand the first source of the natural processes on which life depends and can thereby cooperate in, rather than hinder, the creation of more life and higher life. With Hamlet, we may not only note that the times are out of joint, but with him we may also agree with our responsibility in being "born to set them aright."

A Believer in Grass

Condensed from Successful Farming

Paul Burson

University of Minnesota

HARD luck spelled progress for Harry Fox, farmer near Odebolt, Iowa. It took the form of a searing drought, which in 1934 and again in 1936 ruined thousands of acres of permanent pasture. With the bluegrass practically gone, it was necessary for him to develop immediately some sort of a pasture program to maintain the heavy livestock population on his farm. Of necessity, he has discovered ways in which pasture acres are made to yield twice and three times the livestock feed they produced before the drought.

The first step, in the spring of 1937, was to drill sweet clover and red clover into the burned-out bluegrass sod. To this legume mixture was added just a trace of bluegrass seed. Results were immediate and gratifying. An improved pasture acre, compared with old bluegrass unimproved pasture, was good for 181 pasture days per season against 79—more than twice as many.

The present regular procedure in *improving* old pasture is to graze closely or clip all weeds and old grass in the fall before seeding. Lime is then applied on acid soils, which are disked on the contour to keep the material from washing away before spring. In the spring 200 or 300 pounds of 20-percent superphosphate per acre, depending upon the fertility of the soil, is disked in before the grass seed is applied. Contour disking is then practiced until the sod is completely torn up. This is best done at a time when the frost is out of the soil only enough to make possible preparation of a good seedbed. On seepy hillsides it is advisable to do most of the disking the fall before.

Experience has taught the possibilities of other grass mixtures for pasture. Compared to 79 pasture days per season on old, unimproved bluegrass, a mixture of bromegrass and alfalfa produced 264 pasture days; alfalfa (used for hogs only), 233 days; old bluegrass pastures (improved, second year), 217 days; timothy and alfalfa, 216 days; Sudan grass (for midsummer pasture), 183 days. Where alfalfa was used in pure stands or mixture, a pasture growth of at least four inches

Reprinted by permission from Successful Farming, Des Moines, Iowa, Aug., 1942

was maintained as an essential if the pasture was to be used for a considerable length of time.

The pasture program being developed by Fox and the results he is getting from improvement and good management are directly in line with the summary of the records kept by the top-ranking contestants in each of the Des Moines and Cedar Rapids areas. The following comparisons of carrying capacity of different pastures in the three areas represent 30 counties and about 40 different records of the top-ranking contestants taken during 1939 and 1940. These reports were kept by the farmers and reported to their respective county pasture-improvement committees.

Kind of Pasture	Pasture Days Per Season
Old bluegrass pastures (unimproved)	98
Old bluegrass pastures (improved, first year)	138
Old bluegrass pastures (improved, second year)	217
Rotation pastures (sw. clover, red cl., and timothy)	138
Rotation pastures (alfalfa, red cl., and timothy)	219
Bromegrass and alfalfa	264
Timothy and alfalfa	216
Alfalfa (used for hogs only)	233
Sweet clover (second year)	187
Red clover, alsike clover, and timothy	201
Second crop, red clover and timothy (first crop used for hay)	68
Oats grazed from new seedings	67
Sudan grass (for midsummer pasture)	183
Fall rye (spring grazing)	72

The above figures also represent better management practices because the top-ranking contestants were setting up better grazing practices in addition to their renovation and improvement programs. No matter what mixture is used, how well it is seeded, or how successful the stand, proper management will determine the success of the pasture, according to Harry Fox. All of his permanent pastures, therefore, have a chance to rest during the summer and to go into the winter with a good top growth. Regular pasture clipping is practiced to eliminate uneven grazing and to discourage weeds which the livestock refuse to eat.

An improved 20-acre bluegrass pasture is rotated in the grazing program with a new 40-acre pasture consisting of a mixture of sweet clover, red clover, alsike, and bromegrass. For hogs and calves he uses a four-acre field seeded to bromegrass and alfalfa in rotation with a five-acre field of which one-half is seeded to oats and rape and the other half to Sudan grass.

Grazing at all times is under careful control. Electric or temporary fences divide the pastures to permit rotation. Supplementary pastures of Sudan, rape, second-crop meadow, rye, and oats are always available to take the strain off permanent pastures during the hot dry days. Pasture

acreage is kept in balance with crop acres and livestock population.

Besides greatly increasing the livestock feed on his farm, Harry Fox thru pasture improvement has enjoyed the satisfaction of exchanging experiences with friends thruout the 10 counties participating in the pasture-improvement program sponsored by the Sioux City Chamber of Commerce. In 1939 he was county pasture contest winner, and, in the 10-county district, second place winner for results obtained.

Milk Fever Control

USE of irradiated yeast in preventing milk fever in dairy cattle has given promising results in work carried on at the Ohio Experiment Station, reported the Ohio investigators at the meeting of the American Dairy Science Association at East Lansing, Michigan, June 22 to 26.

In the Ohio experiments dry irradiated yeast in amounts to furnish approximately one million units of vitamin D daily was fed to each cow for a period of 30 days before freshening and one week following. Data has accumulated to include 75 freshenings of Ayrshire, Guernsey, Holstein and Jersey cows, with first calvings not included.

Although there have been cases of milk fever where the yeast was fed, the weight of the evidence indicates that the feeding of irradiated yeast reduces the incidence of milk fever, says the Ohio report. In 26 freshenings of cows known to be addicted to milk fever at calving time, the incidence of milk fever was 73 per cent when no yeast was fed and 20 per cent when yeast was fed. The latter percentage would be materially reduced if those cases where known complications existed were omitted from the calculations.

—*Ohio Farmer*

Halt Stream Bank Erosion with Willow Mats

Condensed from The Ohio Farmer

L. B. Morehead

MANY farmers have a problem of stream bank erosion that causes damage to farm lands, especially during high water seasons. Small streams gnaw away at banks, cut back into pastures and cultivated fields. The rushing waters take the good soil along with them on their way to the sea.

Several methods of controlling stream bank erosion have been developed. There are various types of jetties and levees. But one of the most effective is the use of living willow mats.

This method is simple and inexpensive and can be done by the farmer himself during slack seasons. The living willow mat, as developed by the Soil Conservation Service, is constructed in the following manner:

Mats are laid during the time of year when willows are dormant.

The eroding bank is graded to a 45-degree slope.

The willow (white, if possible) poles, of any diameter, are laid about two feet apart up and down the slope. The butt end of the posts are shoved well down into the water so that they will remain in water even during dry weather. Poles extend from the water to the top of the slope. All limbs are removed and poles are placed the day they are cut, to prevent drying out.

The poles are covered with brush, bushy tops of which are alternately placed at the top and bottom of the bank. (Brush may be of any tree species but willow lays better.) This layer of brush should be built into a mat about 12 inches thick at the bottom (where it goes below the water line) and six inches thick at the top.

Old woven wire is laid over the mat in horizontal bands and laced together with smooth wire.

Stub posts are set about eight feet apart along the top of the mat. Weights of large rocks, concrete, or other heavy material are placed on the mat at low water mark and attached to the posts by long wires (No. 9). These wires, extending from the posts at the top of the bank down over the mat to the weights, hold the weights in place and keep the mat in place during heavy floods.

Reprinted by permission from The Ohio Farmer, Cleveland, Ohio

At each end of the mat the wire should be fastened to a small log and the log secured to the bank by means of posts. Where the stream is large, it may be more desirable to use a large rock-filled woven wire-covered "sausage" jetty, especially at the upstream end of the mat, so that extreme floods will not peel the mat back from the banks.

Keep livestock out with fence or thorny brush, because livestock destroy willows.

During the first growing season the willow poles send roots into the bank, producing a top growth of two to five feet. This dense growth develops into permanent protection to the bank from below the water line to the top of the slope.

Ordinarily all materials are available without any cash outlay except for smooth wire to hold the weights in place and to lace the old woven wire together. These mats are simple to build, and the work makes an excellent labor outlet during the slack winter season.

When the stream is a property line, this type of protection is especially desirable, as it does not change the course of the stream.

Within one season after construction, the mat has developed a dense growth which will hold the soil in place.

Minerals Made Shoes Stick

Shoes wouldn't stay on a seven-year-old horse owned by Eugene LePage, Cole County, Missouri, because the hoofs were soft and cracked so badly.

The blacksmith advised the owner to give the horse a mineral supplement, made up of equal parts of feeding limestone, bonemeal and salt. In a few weeks the horse's feet improved so that he could be shod, and no further trouble was encountered.

—*Farm Journal*

100 Bushels of Corn on 100-Year-Old Land

Condensed from Farm and Ranch

Frank A. Briggs

ONE hundred bushels of corn per acre is a good yield in any state and on any man's land, but when such a record is made on 100-year-old land in East Texas, it is time to sit up and ask how it was done. Not that there is not some good corn land in East Texas, but its average yield has been so low that it has reduced Texas to the lower ranks as a corn-producing state.

The man who proved that a lot of corn can be produced per acre in East Texas is Dr. Griff Ross, of Mt. Enterprise, in Rusk county. He has not only demonstrated that it can be done profitably, but also proved that East Texas soils will respond to heavy fertilization.

Dr. Ross has been interested in East Texas agriculture for many years and has always been an advocate of better farming practices including the use of cover crops and commercial fertilizer. Believing that East Texas farmers should produce more per acre and do it profitably, he set aside one-eighth of an acre in 1940 and planted it to corn. It was good garden land, and he worked up a good seed bed and fertilized heavily. He gathered from this small tract that fall at the rate of 200 bushels per acre. While he did not believe that this extraordinary yield could be repeated, it convinced him that he could multiply the average yield of corn in East Texas many times, and do it profitably.

In the fall of 1941 Dr. Ross selected 3½ acres on his farm which had been cleared more than 100 years ago. It was eroded, and former owners gave up this farm because they did not make enough from it to meet their taxes and payments. It wasn't land one would be likely to select to make a big yield of corn, but the kind of land that would give the hardest kind of a test to his theory. He plowed this land, and in October planted it to Austrian winter peas, using 50 pounds of inoculated seed and then immediately laid off his rows 42 inches wide with a 14-inch middle buster. This covered the peas and they came up to a good stand with the first moisture in October. On April 24 the peas were cut back with a disk and in this disk furrow on top of the beds he ran a 14-inch buster with

Reprinted by permission from Farm and Ranch, Dallas, Texas, Nov., 1942

a fertilizer attachment. He put in 300 pounds of 6-10-7 and followed this with a planter, placing hills 18 inches apart. When the corn was knee high he used 500 pounds of nitrate of soda in the middles and followed this with two furrows in the middles with a 20-inch heel sweep and an 8-inch shovel, pushing the middle over the corn. This was all the cultivation the corn received, and in the fall of 1941 he gathered 341 bushels of corn, or approximately 100 bushels per acre, and put it into his crib at a total cost of 28 cents per bushel.

FFA Boys Become Interested

A community called Minden is located not far from Dr. Ross's corn patch, and his success became of interest to the Future Farmer class of the Minden school. Robert Boyd, vocational agriculture teacher, had already decided that his boys should feed out some hogs and produce the corn needed for the project. Each boy had agreed to plant 2 acres for feed for his hog, and finally it was decided that the chapter would sponsor 3 acres. As a matter of fact, the boys wanted to show Dr. Ross that they could grow as much corn per acre as he did.

During the month of November a plot of ground was selected at a place where the corn could be irrigated if necessary, and work was started to complete the irrigation project before it was actually needed. On the upper side of the 3 acres selected the boys ran a terrace giving a 4-inch fall to 100 feet. They ran their line through the brush for 800 yards close to a spring branch. Then they overhauled a gasoline engine and pump and installed it at the creek. The pump picked up 400 gallons per minute which was conveyed to the corn acreage.

The irrigation plant ready, the boys broke the land 7 inches deep and in April it was broken again, making a mellow seed bed. During the latter part of April they laid off the rows and 250 pounds of 6-10-7 fertilizer was put out. On May 30 the lands were planted to Golden Prolific corn and another 250 pounds of fertilizer applied as a side dressing. The corn was plowed three times and laid by when about waist high. When it grew to 5 feet tall, 250 pounds of 6-10-7 was applied in the middle of the rows and worked in. Three days after the fertilizer was applied, irrigation was started. It was irrigated four times at weekly intervals. The corn was left thick in the drill and soon reached a height of 10 to 14 feet with an average of three and a half large ears to the stalk. It produced better than 100 bushels per acre. The cost, including labor, amounted to $37.50 per acre.

More Chicks Per Hen

Condensed from Poultry Tribune

W. F. Lamoreux

THE war program demands more eggs. One of the most obvious ways of meeting that demand is to hatch more chicks from outstanding hens and sires, fewer from "scrubs." Unfortunately, many of the outstanding birds have no chance to make their maximum contribution to the war effort, because their care and management result in:

1—A short breeding season,
2—Low egg production during the breeding season,
3—Low fertility, and
4—Low hatchability.

Reconsider these points in your treatment of next year's breeding birds, and make sure they are getting the chance they deserve.

Because tradition says that chicks should be reared in the spring, we hatch vast numbers of them from second, third and fourth rate parents, and then during the rest of the year we eat for breakfast the eggs of progeny tested hens proven to be of great breeding value. These birds are the hope of the poultryman's future, yet, during much of their productive year, that hope is forgotten. In the poultry houses of the nation are millions of pullets whose only recommendation is that their parents "could have been worse." Yet, into the frying pan go the most valuable eggs in the country, condemned for no greater wrong than being laid "out-of-season."

Does the good dairyman condemn to veal the heifer calf from his best cow because, perchance, she was born "out-of-season"? No! He just looks across the fence at his poultryman neighbor and laughs! And why not?

It is granted that "out-of-season" chicks may start life with certain handicaps, but good blood-lines can suffer some disadvantages and still win the competition.

Every poultry breeder may well stop and ask himself, "Am I making the greatest possible use of my best birds? Or am I sabotaging the efforts of some of the best chickens in poultrydom?" Remember, this isn't an old-fashioned war! Let's kill a few traditions.

There is an old argument about the need for that annual "rest," but the time for argument is past. It was all based on a mistake in the first place, because what was really meant was to give the hens

Reprinted by permission from the Poultry Tribune, Mt. Morris, Ill., Nov., 1942

a "chance," not a "rest." There are at least three good reasons for giving that "chance" which every poultry breeder should consider. They are low egg production, low fertility, and low hatchability.

Low Egg Production during the breeding season is a natural result of forced production during the late fall and winter. We must recognize that artificial illumination cannot be expected to increase annual egg production. It merely causes some of the eggs to be laid during a season, when, without lights they would not be. By providing 13 hours or more of light daily, it is possible to delay the molt and to stimulate the hens to lay more eggs during the fall and winter.

These eggs represent a loss, and the better the hen the greater the loss. If the hen is a good one, her eggs are worth more for hatching than for market. Since the lights do not increase annual production, the eggs she lays before the breeding season begins are merely subtracted from those laid afterward. It's just an expensive trade of some good hatching eggs for some ordinary market eggs. But that trade is even worse than it seems because there aren't enough really good hens to furnish the required number of chicks anyway. When the production of good hens is reduced, more of the inferior hens are used in breeding pens and the average quality of the chicks hatched and the pullets housed is correspondingly lower than it could have been. When such things happen in industry, we call them sabotage!

Low Fertility follows as a natural result of a low rate of egg production. Convincing evidence has been obtained at the New York and Missouri Agricultural Experiment Stations that hens are less fertile when their rate of production is low than when it is high. Rate of production can be measured in several different ways, and those considered were (1) the number of eggs laid each week, (2) the number of eggs laid during a six-week period, and (3) the number of eggs in a "clutch," or laid on consecutive days. When large numbers of hens and eggs were considered, each of these measures showed that a rapid rate of egg production was associated with relatively high fertility.

The importance of this relationship is shown in Figure 1. The proportions infertile among eggs laid at Cornell University by 1,084 hens during different weeks of five consecutive breeding seasons have been tabulated in one of seven different groups according to the number of eggs laid by each hen during each week. If a hen laid 2 eggs one week and 6 the next, those eggs were re-

corded in the two corresponding groups. The 36,532 pedigreed eggs considered in this study make it clear that the larger the number of eggs a hen lays each week, at least up to seven, the smaller is the proportion of those eggs likely to be infertile.

This relatively high infertility among hens that lay at a slow rate is shown in another way by the following data concerning infertility among eggs laid by hens which laid at different rates during a 6-week period in the middle of the breeding season.

Rate of Laying	Infertile Eggs (percent)
13-22 eggs in 6 weeks	24.4
23-31 eggs in 6 weeks	15.6
32-40 eggs in 6 weeks	13.0

Thus the proportion of eggs infertile (24.4 percent) among those laid at the slow rate was nearly twice as great as among the eggs laid at a rapid rate.

This difference apparently results from the fact that hens which are laying at a rapid rate mate much more frequently than do other birds.

Low Hatchability must also be added to the list of penalties associated with a low rate of egg production. This was shown by Professor Funk, Missouri Agricultural Experiment Station. Among fertile eggs laid in large "clutches," a larger proportion was able to hatch than was possible among eggs laid in small clutches, and therefore at a slower rate.

Size of "Clutch" No. Eggs	Eggs Set No.	Fertile Eggs Hatched—%
1	845	58.9
2	1727	67.6
3	1676	71.5
4	1129	72.4
5	698	71.2
6	464	78.0

It is now clear that any system of management that results in relatively low egg production during the breeding season may involve a four-fold loss: (1) the exchange of valuable hatching eggs for less valuable market eggs laid at another season, (2) the unnecessary use of relatively poor birds as breeders, (3) relatively low fertility, and (4) poor hatchability. Considered alone no one of these losses may appear important, and hence they pass unnoticed by many poultrymen. Considered together, the cumulative effect of these losses can do much to prevent attainment of the wartime goals of the poultry industry.

Maximum Egg Production during the breeding season can do much to reduce these losses. High production can be encouraged by means of the following program, assuming that eggs for hatching are wanted on February 1.

1. Encourage prospective breeding hens to molt not later than October 15 to November 1.

2. Do not furnish artificial light during the molting period. The short days of winter are favorable for rapid recovery of body weight following the molt, long days are not. Artificial light during this period will retard recovery of body weight and encourage the laying of eggs at the expense of production during the breeding season. Use artificial light to provide the hens a 13-hour day beginning January 17, or about two weeks before hatching eggs are wanted.

3. Feed and care for the birds as well as you know how. Remember it is no less strain upon the hen to grow a new coat of feathers than it is to lay eggs. Some evidence indicates that the strain resulting from a rapid molt is even greater than that of egg production. You are not giving the hen a "rest" during the molt. You *should* be giving her a "chance" to do a hard job well, grow a new coat of feathers, gain enough in body weight to begin the breeding season with some reserve energy, and to make up for any nutritional deficiencies, known or unknown, that may have developed during the previous year. If you *must* cheat on the breeding hens' diet, always do it after the breeding season, never before.

Manure Yields Profits to Lamb Feeders

Condensed from The Dakota Farmer

Livestock feeding in connection with the operation of an irrigated farm not only provides a dependable market for feed crops but also returns valuable fertilizer to the land.

At the Huntley field station in Montana, barnyard manure was worth $3.33 a spreader load according to a recent study comparing the yields and relative value of crops in two 6-year rotations.

Results of lamb feeding trials carried on the last few years at the Belle Fourche field station in South Dakota show that a pen of 100 lambs fed 120 days in an open feed lot with ample bedding will produce from 30 to 36 spreader loads of manure. On this basis, three lambs fed 120 days in an open lot with ample bedding will produce one spreader load of manure. Using the Huntley station's findings, each lamb will produce manure worth approximately $1.11.

Even in favorable years, nearly half the profit in lamb feeding may be in the manure left in the feed lot after the lambs have gone to market. In unfavorable years, the fertilizer value of the manure may represent the only profit from the feeding enterprise.

Farm Machines Fight for America

Condensed from Nation's Business

Bliss Isely

IN battling an enemy that has staggered the world with mechanized might, America possesses a machine arm which the dictators neglected as they planned this war. Our nation's farm equipment is the envy of the world. Today we have three times as much power equipment on our farms as we had in 1917.

So rapid has been farm mechanization in 20 years that the census enumerators found more than $3,000,000,000 worth of machinery in 1940 in the hands of the men who grow our wheat, meat, fats, cotton, wool and shoe leather.

How gasoline is magnifying man power on the farms is illustrated by figures from Kansas, our leading wheat and flour state. There, so statisticians at the state college report, it required 35 minutes of the average farmer's labor to produce one bushel of wheat in the five-year period of 1909-1913. Today it takes only seven minutes to produce a bushel.

Anybody can figure the reason. The average farmer of 1909-13 drove a team gaited for field work at two and a quarter miles an hour, hitched to a one-bottom plow. Today he has a two-bottom plow drawn by a tractor, geared to five miles an hour. Again, in 1909-13, the average farmer bound, shocked, stacked and threshed wheat, thus requiring four operations and a crew of men. Today with one helper—often with none — he completes the task in one operation by use of a combine.

What has happened in the wheat states has been accompanied by a parallel revolution in Iowa and other corn states, as is shown by a news item published at Flandreau, S. D., where a farmer, Tom Chamberlain, died last November, leaving 80 acres of corn unharvested. Had he lived, he would have husked that corn by hand and it would have taken from 35 to 40 days. But eight of his neighbors, each with a mechanical corn-picking machine, drove into the farm yard one morning and notified the widow that they had come to husk her crop. By noon the entire task was completed and the corn was in the crib.

A certain variety of economist has, in the past dozen years, been branding the farm machine a curse. This economist has shown with considerable truth that, after

Reprinted by permission from the Nation's Business, Washington, D. C., Aug., 1942

a farmer has spent $1,400 for a tractor, $270 for a wheat drill, $170 for a three-bottom plow, $750 for a combine and $800 for a truck, he is out of cash and credit. At the same time he is equipped only for wheat growing. It takes only from 50 to 60 days for a farmer to plow his wheat fields, drill the seed and harvest the crop. If he is a one-crop wheat farmer, his idle machinery does nothing but eat interest on his investment for the other ten months.

We should not, however, blame the machine for its abuse. When Washington was inaugurated as President, 97 per cent of our population was needed on farms to feed and clothe the people. Today, with machines, 23 per cent do the same task and the rest of the people are released to make possible the standard of living of which we are so proud.

Thanks are due the implement manufacturer for what he has done for all of us. Moreover a close partnership exists between the man who makes power equipment and the man who uses it.

This partnership begins when the manufacturer finances the farmer in his purchase of machinery. Usually the farmer pays one-third down, a second third after harvest and the last third after the second harvest. If the farmer has old machinery, he turns it in on the purchase price, either to be sold as a used machine or to be scrapped. The used machine market, however, is not a very large per cent of the whole. For economic reasons the farmer prefers to wear out his old equipment. This is shown by the Census of 1940, which found that 35 per cent of the tractors on farms were ten years old or more.

In financing the farmer in his purchases, the manufacturer holds the notes in the central office or at a branch house. These are not sold to banks as other commercial paper. In case of crop failure or falling prices, the manufacturer suffers losses with the farmer by extending the life of the note. Sometimes it is necessary to extend it several years.

In developing new machinery the manufacturer and farmer again are partners. Most of the new inventions are by farmers with imagination, who learn by trial in the field what improvements are needed. Farmers invented the combine, corn picker, tractor, damming lister and a host of other machines. A goodly percentage of inventions also come from research work in agricultural colleges. The forage-harvester, for example, was perfected after 13 years of research at the University of Wisconsin.

The manufacturer generally buys the patent on a new inven-

tion either outright or on a royalty basis. Each year implement company engineers perfect crude machines that come to them from the inventors. For lack of such research engineers, the threshing machine and wheat drill invented by George Washington never were developed commercially. They were sound in principle, but cost too much to operate.

The tractor has undergone remarkable refinement in the laboratories of the implement companies and the improvement is yet progressing. Every year sees something better in tractors. Twenty years ago a tractor weighing 22,000 pounds could develop 60 horsepower on the flywheel but only 30 horsepower on the drawbar. In other words half the horsepower was spent merely in moving the machine. The tractor of 1942 that develops 30 horsepower on the drawbar need develop only 35 horsepower on the flywheel. Engineers have regeared the engine and refined the metal until a 30 horsepower tractor weighs only 5,400 pounds.

The new tractor can serve on a diversified farm as well as one a one-crop farm. It can turn around in a kitchen, can be hitched to any field implement, can haul a train of wagons on the road and can operate feed grinders or a corn sheller in the barnyard. The speedy, new tractor, however, has made much old farm equipment obsolete. The mold board of a plow that works well at a speed of two and a quarter miles an hour must be streamlined if it is to work at five miles an hour. Other machinery, too, must be rebuilt to harmonize with the greater speed.

Another tool perfected by the factory engineers to promote diversified farming is the new combine, brought out in 1941, which can harvest and thresh 100 different kinds of grain and grass seeds. And so, instead of working through the brief season of the wheat harvest, it is employed through all the harvests. The small combine is another development to benefit the diversified farmer. Before 1938, few combines could cut a swath as narrow as six feet. Last year 90 per cent of those sold would cut a swath six feet or less. Some have a cutting sickle only 40 inches long—cost $400 delivered on a Kansas farm and less in Illinois, which is nearer the factory.

A revolutionary machine, first brought out commercially in 1941, is the forage-harvester, which sells for $350 delivered in Kansas and is threatening to send the pitchfork, last surviving symbol of farm drudgery, to keep company with the flail and scythe. Drawn by tractor power, it mows green grass or green fodder in the field, chops it into silage and loads it on a rack. The

tractor takes the rack to the barnyard where a blower snorts the green feed into the silo. Later the blower can blow the feed from the silo to the feeding rack. The forage-harvester also picks dry hay from the windrow and blows it into the barn without the use of a pitchfork.

Farm equipment is continually improving. For the past 38 years the manufacturers have held a coming-out party for their new models at the Western Tractor and Power Farm Equipment Show held the last week in February at Wichita, Kan., which is an important machinery distributing center for the southwestern Great Plains. The Plains afford an ideal proving ground for new models and this area also is the center of new inventions.

A year ago 165 exhibitors, representing practically all the large manufacturers and some of the small ones, brought displays. Factory engineers came to inspect new designs produced by their rivals. Dealers from 15 or more states came to keep themselves posted. The Russian Government sent no representatives last year but it had done so in previous years, because Europe has nothing like America's big farm-equipment show.

No fan dancers or other side shows have ever been used to draw the farmers, who came to see nothing but machinery and motion pictures explaining the machines. In the past six years the attendance has been from 150,000 to 175,000 men and women. Farm women are power-machinery fans, because the wife on a mechanized farm does not serve as laundress to her husband's hired man, nor does she slave in the kitchen for a gang of helpers at threshing time.

As the new year comes, farmers are concerned over the limitation of materials allotted to the manufacturers by the O.P.M., but they are prepared to make their old machinery do.

Even with curtailed manpower, even without new machinery, the American farmer is out to provide the cotton, calories and vitamins needed to win the war.

How to Establish and Maintain the Farm Flock

Condensed from Sheep Breeder

W. G. Kammlade

Chief in Sheep Husbandry, University of Illinois

MODERN methods of sheep production developed as a result of research and experience, make successful sheep raising possible. Good sheep husbandry is however, dependent upon efficient crop and pasture production.

It is unlikely that any animals excel sheep in utilizing pasture and roughages and they do not require large amounts of concentrates. They use almost 14 acres of pasture and roughage to each acre of grain, according to records of farm flocks. The ability of sheep to destroy weeds and the fertilizing value of their manure are widely known. When carefully managed, a flock of sheep is profitable and can be used to help in soil conservation. Altho sheep do better than some other animals on poor soils, this does not mean that they are unprofitable on highly fertile land.

Although requiring at times a distinct kind of care, sheep are as easy to raise as other livestock if their needs are understood and they are skilfully tended. The amount of labor necessary to care for them is not great on most farms, except where purebred flocks are maintained, usually not more than five hours a head annually.

A certain amount of equipment is required for the enterprise but its construction and design need not be elaborate and does not require a large cash outlay.

Some increase in sheep raising may be justified at present since production in the United States is on a domestic basis; that is, the lamb and wool produced in this country are necessary for the nation's needs and there is no surplus for sale elsewhere. Indeed, for many years considerable amounts of foreign wool have been used in this country. Sheep raising should not be expanded, however, without considering its relation to other farm enterprises and the usual demand for lambs and wool. While it is not unusual for those who have flocks of sheep to receive a very good return on

Reprinted by permission from the Sheep Breeder, Chicago, Ill., Nov., 1942

their investment, this income depends much upon price levels and upon economical and skilful management. Sheep raising must be guided by as much intelligence, and the tasks executed with as much skill, as in other phases of farming if comparable results are to be assured.

Even when sheep raising is one of the minor parts of the farm business, the number of breeding ewes should be large enough to justify good husbandry without too great expense per head. The number will, of course, vary according to conditions and the size of the farm, but for an average farm of 160 acres, 40 ewes is about the smallest number likely to return sufficient income to make the keeping of a flock worth while. If conditions do not permit this number, it is doubtful whether sheep raising should be undertaken. This number is equal to six or seven cows in ability to utilize farm feeds and pastures and hence cannot be considered a large flock.

A flock of about 40 sheep has a number of advantages that a smaller one does not have. Suitable equipment costs less per head. The labor requirement is not much greater than for a smaller number given the same attention, for sheep require little individual attention except at lambing and shearing times. It is possible to purchase a good ram for a flock of this size, and yet the sire cost per lamb will not be excessive. Enough lambs and wool can be obtained to justify careful preparation of these products for marketing. Another advantage in a fair-sized flock is the greater opportunity to select ewe lambs for it.

Many flocks are of course made up of more than 40 ewes. So long as feeds and labor are available, there are no disadvantages in larger numbers. In fact there is much less likelihood of neglect in the management of a large flock than there is when only a few ewes are kept.

To have a profitable flock an owner must see that each ewe regularly produces good market lambs and an abundance of high-quality wool. This means that he must carefully select and cull the flock on the basis of those things which are generally desirable in breeding ewes.

Size. For farm flock purposes, mature ewes ranging in weight from 125 to 175 pounds when in good flesh are suitable. There are no special advantages in having very large ewes. Under-sized ewes often do not produce so well as those of at least medium size, altho there are individual exceptions. Size is not, however, wholly a matter of weight.

Form. Ewes that are moderately short-legged and that have deep, wide, roomy bodies have

more capacity for production than those that are shallow and narrow. Very fine-boned, weak-appearing ewes should be rejected, as they lack the hardiness needed to raise large lamb and wool crops.

Age. Except in the case of purebreds, ewes are generally not kept after they have reached about seven years of age. The years from two till seven are the years of maximum production for most of them. The price one has to pay for ewes declines as their age advances, but this does not indicate that very cheap old ewes are the "best buy." Indeed, thin, "shelly," worn out, "broken-mouthed," old ewes are very seldom worth taking home, because they are not able to make efficient use of feed and seldom raise good lamb and wool crops. Age in itself, however, is not so important as are the evidences of a marked decline in productivity.

Soundness of Udder. Anything which interferes with a ewe's ability to produce milk is a very serious handicap. In purchasing or culling, one should examine udders and teats and should not accept or keep any ewes that are abnormal in any way. Lumps in udders, or teats that have been injured by careless shearing usually mean future difficulties and dissatisfaction, and the ewes should be rejected. Even with a careful examination it is difficult to detect all abnormalities of the udders in case of dry ewes.

Fleece. Altho lambs account for the greater part of the income from a flock, returns are greatly influenced also by the wool production of the ewes. While there are many things of importance to consider in judging of the quality of wool, if the purchaser or flock owner will examine the fleeces carefully, he will soon learn to distinguish the desirable from the undesirable.

In general, it is advisable to choose ewes with fairly dense or tight fleeces of fair length. Wool which reaches a length of 2½ to 3 inches in a year's time is more valuable per pound than wool of the same fineness that is only half as long. Fleeces of good length and density are also usually heavier than any other kind. Avoid sheep that have very short wool, those with very loose, frowsy wool, and certainly those with fleeces any other color than white.

The extent to which the fleece covers the body is important, as this influences the amount of wool produced. It is more important, however, that there be a good covering on the under part of the body than on the extremities—face, and legs below knees and hocks.

Health and Constitution. Regardless of all other considerations in selecting ewes, health and

a strong constitution are the deciding factors. It is useless to try to make a profit from a flock of sheep lacking in health or not made up of ewes with strong constitutions. Sheep deficient in these features should not be purchased and, if an established flock contains any of them, they should be culled because they are a menace to the rest of the flock. A general lack of health is indicated by dullness, absence of vigor, and poor general condition.

Select Breed for Lamb Production

The value of a ewe depends upon the pounds of desirable marketable lambs and wool she produces each year. Since lambs account for a much greater proportion of the gross returns from the flock than wool does, lamb production should be emphasized. Wool production must not be disregarded, however, since returns from wool add significantly to the income, and in years when ewes fail to produce lambs this is the only source of income from them.

The ability to produce desirable lambs varies greatly with different ewes, and some types and breeds are much more suitable than others for farms in Illinois. From the market standpoint lambs of the medium-wool type or lambs similar to them are best. Altho different types of ewes are suitable as long as they are good milk producers and yield heavy fleeces, it is generally best to use rams of the medium-wool mutton type.

While there are considerable differences between breeds with respect to breeding habits and the kind or quality of lambs and wool produced, individuals within a breed also differ greatly. It is important, therefore, to exercise as much, or even more, care in selecting individuals as in choosing the breed.

Medium-wool Type. The two most popular medium - wool breeds in Illinois at the present time are Hampshires and Shropshires, but Oxfords, Southdowns, Suffolks, Corriedales, Dorsets, and Cheviots are also raised. While the distinctive features of each breed, such as color of face and legs, size, shape, and carriage of ear, are important as a means of identification and as evidence of care in breeding, the utility and profit-producing properties are of much greater concern to farmers raising lambs and wool for market. For this reason the producers of purebred sheep should emphasize, within the limits of acceptable breed character, the practical utility features of their breed. Following are the generally recognized differences associated with lamb and wool production of various breeds.

Shropshires, generally regarded

as a medium-sized breed, produce fleeces of medium fineness and length that average 9 to 10 pounds. When the lambs are fat and are of proper weight, they meet requirements for market very well. Under favorable conditions many twin lambs are raised. If the lambs have large well-developed parents, and if milk and other feeds are plentiful, they grow to 85 or 90 pounds in 4½ to 6 months. Some Shropshires are criticized by market lamb producers because they are too small and have too much wool about the face. Also, some Shropshire ewes do not breed early in the fall.

Hampshires are popular because of their large size and the rapid growth of their lambs, excelling Shropshires in both these characteristics. Hampshires are coarser than Shropshires, and the Hampshires generally shear fleece 2 to 3 pounds lighter. The light fleece is one of the chief criticisms of the Hampshires. Many ewes breed early enough to produce lambs in January or earlier, and many of these lambs are used the same year as sires.

Oxfords, the largest of the medium-wool breeds, yield heavy fleeces of fairly coarse wool and produce rapid-growing lambs. If these lambs are fat and not overweight, they satisfy demand on the market. But there is some complaint that many lambs of this breed do not fatten easily until they are too heavy for top-quality carcasses.

Southdowns are small and generally very refined. They are usually rated as having the best form of all breeds because they are low-set and compact and they are unsurpassed in quality of carcass. They are, however, considerably slower than the larger breeds in reaching weights of 85 or 90 pounds. They shear 3 or 4 pounds less fleece than Shropshires.

Suffolks are large and upstanding, quite the opposite of Southdowns, and are rated low as wool producers. In this country they are used mostly for crossing purposes. Generally the ewes are good mothers and their lambs grow fast.

Dorsets differ from other breeds of the medium-wool type in that many of the ewes produce out-of-season lambs and in instances lamb twice a year. Most producers should not, however, count on two crops of lambs in a year's time. The Dorsets do not produce heavy fleeces, but the ewes are generally regarded as good milkers and their lambs grow about as fast as, or somewhat faster than, lambs of the Shropshires.

Cheviots are a hardy, active breed of good quality. They are small in size and light-fleeced. Many market men say they pro-

duce few lambs that finish well.

Corriedales have been actively promoted in recent years, but not all the claims made for them are true. Generally they are not so well made as the Shropshires and their lambs neither grow nor fatten any faster. They usually produce a large amount of good-quality wool.

Long-wool Type. Few sheep of the breeds of long-wool type are raised in Illinois at present. This group includes Cotswolds, Lincolns, Leicesters, and Romneys. These animals yield coarse long wool in large amounts. Altho they are also of the meat type, they are not generally considered equal to the medium-wool breeds in meeting present-day market requirements. Their lambs grow fast, but do not finish readily at the best market weights. Long-wool breeds have been used with fine-wool breeds in developing such recent crossbred types as the Corriedale, Columbia, Panama, and Romeldale.

Fine-wool Type. Most of the fine-wool sheep in Illinois are brought in from areas in the West, where they are raised extensively. Rambouillet and Delaine Merinos predominate, as the types with many heavy folds in the skin are not looked upon favorably by men raising market lambs and wool. Rambouillet ewes that are free from heavy wrinkles and large Delaine Merino ewes are suitable for farm flocks. Bred to medium wool rams, these ewes raise market lambs of good type. Of the medium wool rams used for crossbreeding with fine wool ewes, the Southdowns sire lambs of highest quality but Hampshire rams and others of the larger breeds sire lambs that grow somewhat faster. Ewes of the fine wool breeds generally yield large amounts of wool.

How to Buy a Farm

Condensed from Southern Agriculturist

H. C. Holmes

Assistant Farm Management Specialist, Tennessee Agricultural Extension Service

TO the practical farmer, a farm is worth what it will produce under the system of farming that he, by necessity or choice, plans to carry on. In addition, the farm may have further value to him due to its location near schools, churches, towns and highways; or a lesser value because he doesn't like it as a place to live. This latter value may be easily overemphasized, and the buyer may find himself with a poor farm in a good location with a big mortgage that is practically impossible to carry, except during periods of exceptionally good prices.

If one knows a farm from years of observations, having seen the crops in good years and bad; knows on which fields the corn will burn up during a dry season and drown out when the season is a little wet; knows what has happened in the past on the farm and why, he is in position to estimate what he can produce, and what he can afford to pay and how well he can weather a depression.

The farmer, however, who has not had the opportunity of close association with the farm, should take his time. Snap judgment is dangerous business when buying a farm. Look the farm over carefully, field by field, noting the condition of the growing crops. Find out what the past crops have been. Examine the subsoil, look out for hard pans, clay pans, poorly drained, wet, tough, plastic or excessively open subsoil. That's where the plant roots feed.

Records of crop yields for the past five or six years are extremely valuable, if accurate. Check changes in ownership, and the income of previous owners from non-farm sources. After carefully determining what each field can be used for, the probable rotation and treatment that will be necessary, and the probable normal production, one can figure the chances for success.

Estimate normal cash crop production, amount available for sale, probable grain and hay production, and the numbers and kinds of livestock that can be produced for market. With these practical estimates valued at

Reprinted by permission from the Southern Agriculturist, Nashville, Tenn., Nov., 1942

normal rather than inflated prices, one can determine quite well what he can afford to pay for a farm.

It is often good business to buy a farm with good soil that has been neglected, but a farm with a large proportion of poor land is a serious handicap. It is important to be able to distinguish the difference between good soils that have run down and soils that are naturally unproductive.

All level land is not productive land. Poor natural drainage often detracts from bottom soils. Poor internal drainage on upland soils frequently causes crop failures. A farm with steep slopes is not necessarily a poor one. Some of our most productive soils occur on slopes. The greatest difficulties here are erosion and possible lessened efficiency of farm equipment. But great strides have been made in adapting farm machinery to smaller and steeper farms. The small, all-crop harvester now makes possible much wider use of grain and seed crops on smaller fields and rougher land.

Buildings should be valued according to their usefulness on the farm, rather than from their original cost or the amount of insurance one can get on them. Buildings do not return a profit, but require upkeep. The location, kind, condition, and practical use for the buildings, should be noted. Special attention should be given the foundations and roofs.

It is generally much safer to rent the farm for a year or so with the option to buy; in farming the land many things will become apparent, both good and bad, that will be overlooked by hasty inspection. Good buildings and a favorable season can cover up a lot of wet, poor, droughty or otherwise problem land, and bring on a bad buy for the long haul.

Take Care of Your Machinery

Condensed from Ohio Farm Bureau News

J. E. Reaves

Farm Maintenance Division, Farm Bureau Cooperative Association

WHILE the government has not yet announced the allotment of new machinery for 1943, it is very certain there will be much less new machinery in 1943 than there was in 1941.

Manufacturers were permitted to build 82% as much machinery in 1942 as they were in 1940. This was not so bad when we take into consideration that factories, branch warehouses and dealers all started the year with a fair-sized inventory. These inventories at the present time are practically sold out, however, and it now seems probable that the manufacturers will be allowed to make in 1943 only 20% of their total of complete implements for 1940, and 130% of the 1940 total of parts.

With a situation like this facing us, we should take every precaution possible to make our present implements last longer. The following are a few timely suggestions before putting your equipment away for the winter:

1. Clean the moldboards, landsides, jointers and coulters thoroughly.
2. Grease same with cup grease.
3. Check for worn, broken, or bent parts.
4. Order NOW at least one set of new shares and any broken parts that you might need.

Disc Harrows

1. Clean the disc blades thoroughly.
2. Grease same with cup grease.
3. Check for worn or broken parts and, above all, remove bearing caps and check for excess wear. If using removable bearings, order a complete new set NOW.
4. If scrapers have been removed for fall use, it may be well to gather them out of the fence corner and install same for spring use.

Grain Drills

1. Clean fertilizer box and spouts with a dry whisk broom.
2. Use the same broom and apply a liberal application of kerosene to all metal parts. This should be done inside the box as well as out.
3. Thoroughly clean the discs or hoes, as the case may be, and

Reprinted by permission from the Ohio Farm Bureau News, Nov., 1942

apply a liberal application of cup grease.

4. Empty grain box, as mice and rats are not only liable to damage the box but may build nests that work down into the cup.

5. Check for broken or worn parts and order same NOW.

Potato Diggers

1. These should be thoroughly cleaned with a stiff broom.

2. After all dirt is removed, give all metal parts a good application of kerosene, using a small broom or brush.

We have heard a lot in the last year about no curtailment of metal for new parts, but this proved to be more propaganda than facts. A lot of manufacturers could not fill all the demands for parts on quick notice.

By following the above suggestions, we can make the old implements last a little longer.

Milking the Cow

The blood circulation of a dairy cow is a primary factor in the milk she gives. Recent experimental work, says G. G. Gibson, assitant dairyman of the Texas A. and M. College Extension Service, shows that 400 gallons of blood passes through the udder for every gallon of milk a cow produces. Multiply this by the day's yield and the immense amount of work a cow's heart does to fill her share of the nation's milk bottles is apparent.

Most milkers have noticed upon sitting down that the udder did not appear to be full. Soon, however, it filled up because 'the cow lets down her milk." This business of "letting down" happens in this way: A stimulus associated with milking is carried by the sensory nerve to the brain, which sends a message to the pituitary gland, which releases a hormone which is carried by the blood to the udder. This causes contraction of the muscle fibre in the secretory tissues of the udder, forcing the milk into the lower part so it can be drawn out.

This is the cow's job, but the cowman's collaboration also is important. To extract all of the cow's milk he should milk at the same time night and morning. A good milker must be able to get along with cows, otherwise poor production results. Nothing should be done to stimulate milk letdown any considerable time before milking, since this means that the hormone which has been secreted in the blood stream will be dissipated and the edge gone from the cow's ability to force down her milk.

—*Texas Farming & Citriculture*

Good Cow Air That Saves Barns

Condensed from Electricity on the Farm

J. B. Stere

AN article which appeared in the November and December, 1940, issues of *Electricity On the Farm* provided information about dairy stable ventilation that many dairymen have long needed.

The described method of ventilation was developed by Messrs. F. L. Fairbanks and A. M. Goodman of Cornell University, and is known as the Fairbanks-Goodman System. The basis of this system is that a comfortable environment is maintained in a tightly constructed dairy stable by removing 60 cubic feet of air per minute per 1000 lbs. of cattle from near the stable floor, and replenishing it with fresh air equally distributed around the walls near the ceiling. This is best accomplished by means of an electric exhaust fan of proper capacity and the installation of fresh air intakes of proper design, location, and number. During periods when animals are stabled, the fan should be in continuous operation.

New York dairymen who have used this system for a number of years have found it to be practical and highly satisfactory. They report that building repair bills have been substantially reduced, health of animals improved, milk production maintained, drafts eliminated, colds prevented, and hay saved—all for a very small investment, and a low cost of operation. These results stimulated our interest in making observations of the performance characteristics of this system under conditions found in Western and North Central Pennsylvania and prompted 32 similar installations during the Fall and Winter of 1941-'42. Arrangements were made with 12 of these dairymen, located in various sections of the territory, to keep performance records of their systems. These 12 installations represented stables with capacities ranging from 12 to 40 cows and with construction varying from one-inch wood walls to well insulated walls. A summarization of these records follows:

In no case was it necessary to remodel the stable before installing the system. An essential requirement was that a stable be tight and air leaks around doors

Reprinted by permission from Electricity on the Farm, New York City, Nov., 1942

and windows be stopped. When required, doors were provided for closing the hay chutes and passage ways to the silo or mow floor. Most of the barns were of the bank type which is rather typical in Pennsylvania and does not require complete insulation. Ceilings were insulated by two or three feet of hay or straw or a few inches of chaff on the mow floor immediately above, and where the barn floor was integral with the dairy stable ceiling, this was of double thickness.

Where cattle stalls were adjacent to exposed masonry walls, such walls were insulated. In one stable with box stalls along an eight-inch concrete wall exposed to outside conditions, it was not possible to maintain satisfactory temperatures in these stalls except by insulating the walls.

A factor that gave the greatest concern to dairymen who were considering the installation of a system was how it could be possible to maintain comfortable temperatures with a fan operating continuously. After some experience under severe winter conditions, this apprehension vanished.

With an outside temperature variation from 32° to 0° F., inside temperatures in uninsulated stables ranged between 50° and 45° F. and between 55° and 50° in insulated stables. With an outside temperature of 20° F. below zero, the inside temperature of uninsulated stables was found to be between 38° and 44° F., while the lowest inside temperature of the insulated ones was 45° F. Fully insulated stables had more uniform and higher temperatures, but it is questionable whether the cost of complete insulation is justified to provide for the relative short periods of extremely cold weather experienced in this area. Several dairymen made comparative studies on temperatures in extreme cold weather by turning the fan off and observing temperature readings; then the fan would be turned on and temperature readings checked. It was noted that the temperature at cow height would increase when the fan was started after being off for several hours, indicating that the fan circulates the warm air that accumulates at the ceiling. In one instance, water pipes froze when the fan was off, but did not freeze with the fan running, even though the outside temperature was 5° colder.

In practically every instance, the motivating incentive for installing a ventilation system was the excessive moisture deposits on the ceilings and walls. In previous winters, some of these stables had as much as one inch of frost on the walls and water dripped from ceilings. In a number of instances, periodic measurements of moisture after the systems were in operation showed a relative hu-

midity range of between 50% and 68%. These measurements did not mean much to the dairymen, but the dry condition of their walls and ceilings was evidence of satisfactory performance. The only place where condensation was noticeable was on single sash windows. This steaming of windows, as it is commonly called, could have been corrected by installing double sash windows. However, the moisture condensation in each case was not considered serious enough to justify the extra cost.

Oxygen and carbon dioxide contents of the air were not measured, but the satisfaction expressed by the dairymen as to the freshness of the stable environment; also that voiced by members of his household, who noticed a marked reduction in the odors carried by the men's clothing, was their measurement of satisfactory performance of this system in respect to odors. If ever in doubt as to whether the system is removing odors, one only needs stand in front of a fan that is in operation for a few seconds.

The cost of materials, including hardware cloth (¼" mesh) to cover intake openings, lumber for intake and exhaust flues, insulation for the intake flues, wiring to the motor, nails and complete fan assembly, averaged about two dollars per cow. One of the small installations (12 cows) was made at a cost, exclusive of labor, of $27.07 and one for 25 cows, at a cost of $41.50. The average electrical energy consumption for the installations studied was 2 kw-hr per cow for each month that animals were stabled. An installation can usually be made by the farm hands during periods when other work is slack. An experienced carpenter can install a system for 20 cows in about 2 days.

As a result of last winter's satisfactory experiences by users of this system in our territory, 50 additional dairymen are now planning early installations at their farms. Direct drive fan assemblies are now difficult to secure. An improvised belt-driven fan will probably be substituted for the duration. Belt-driven fans are not as attention-free as the direct driven type, but dairymen who are filling their stables to capacity will need ventilation now more than ever, and are willing to give the required attention to this second choice fan. The direct drive fan is powered by an enclosed fan duty motor. This type of motor facilitates mounting the fan on the motor shaft and the complete assembly can be placed in the air stream. Usually the improvised, or belted, exhaust fan is powered by a multi-purpose motor of the open type with sleeve bearings. Consequently, a fan so powered can neither be mounted on the

motor shaft nor is it practical to place it in the air stream.

When a ventilation system is being installed during spare time of farm hands, after the cows are stabled, it is suggested that the exhaust fan be installed first. The fan can either be installed near the floor (15 inches from center of fan to floor) without an exhaust flue, but protected with heavy wire, or it can be placed near the ceiling with a flue that extends to within 15 inches of the floor. The latter, and more desirable method was used in all the installations in our territory. By having a door in the top of the flue, this method also facilitates using the fan to quickly remove warm ceiling air as an aid in cooling the stable, and in many instances to directly remove accumulations of hay dust. The exhaust fan is located on the side of the building away from prevailing winds and directed away from dwellings.

Materials for constructing intake flues are usually available on the farm. Two intakes are installed for each seven cows. Each intake has an inside cross-sectional area of 60 square inches, and is from 18 to 24 inches in length. The intakes are insulated with ½-inch insulation board to prevent condensation and are equally spaced around the stable not closer than 15 feet apart or within 6 feet of the exhaust flue. The top of the intake flue should be 12 inches from the ceiling. If the stable is unceiled, a deflector at least two feet square is constructed directly above the intake.

Proteins, Minerals, Vitamins Affect the Reproduction of Farm Animals

Condensed from The Jersey Bulletin

National Research Council

STERILITY in farm animals can be conservatively placed at 10 per cent. If the number of animals kept on the farm in the hope that they will eventually reproduce is included, this figure is about doubled. This is especially true of cattle. Field inspection has led us to expect that two out of every 20 breeding females will have serious breeding difficulties and that a like number will be "shy breeders." A survey by Vergeront of herds of members of the Dairy Herd Improvement Association of Wisconsin shows that 8-10 per cent of all dairy cows disposed of during 1938 to 1940, inclusive, were sold because of sterility. These figures represent 10,000 to 12,000 disposals annually during these years.

The fact that reproductive performance is related to nutrition is well established. The classical studies of Hart and coworkers at the Wisconsin Experiment Station in 1911 demonstrated this principle, but the specific factors which caused the reproductive failure in this instance did not become clear for more than a decade. In 1924 these factors were definitely shown to be deficiencies of calcium and vitamin A. Since the date of these experiments many new facts have accumulated to show that dietary deficiencies may directly or indirectly cause a disturbance in reproduction of farm animals.

It is now a recognized fact that efficient reproduction depends upon the satisfaction of all nutritive requirements. The reduction of any particular constituent of the ration to minimal or subminimal levels may be the occasion for reproductive failure. Such dietary factors as calcium, phosphorus, iron, cobalt, manganese, protein, energy and vitamins have been shown to be needed for successful reproduction. Fortunately, the nutritive requirements for reproduction are met by the usual feeding practices in most instances.

Under farm conditions, particularly on the marginal farms and in many parts of the range country, feed energy becomes one of the limiting factors for suc-

Reprinted by permission from The Jersey Bulletin, Nov. 5, 1942

cessful reproduction. Under such conditions an increase in the total feed consumption will appreciably improve reproductive performance.

Underfeeding to the point of inhibiting growth, or causing the loss of weight in the adult, will itself greatly interfere with or inhibit reproduction. An unpalatable ration, a marginally deficient ration, or a very restricted ration, may so adversely affect appetite as to produce inanition and reproduction failure. On the other hand, supplying excessive amounts of energy results in an over fat animal, a condition long associated with sterility. Such animals are adequately fed as far as energy intake is concerned, but they suffer from other dietary deficiencies, which result in "shy breeding," partial, or complete sterility.

Under normal feeding conditions reproductive failure is not apt to occur as the result of low protein intake. Protein from restricted sources, fed at minimum levels, can disturb reproductive efficiency. It is necessary not only to maintain protein balance in the ration, but to provide a protein containing the proper combination of amino acids. Since ruminants have the capacity to synthesize proteins by means of the bacteria inhabiting the rumen, their protein requirements are less exacting than animals with simple stomachs. Therefore, a well-selected ration containing enough energy to maintain good condition will usually satisfy the protein requirements for reproduction in ruminants.

In the case of swine, the protein requirements are more exacting than those of the ruminant. Under farm conditions, this species lives on a more restricted diet as corn or barley forms the main bulk of the ration. Such rations must be fortified with protein supplements which furnish the essential amino acids not present in adequate proportions. Plant proteins have not given the best results as supplements to cereal feeds for swine. The inclusion of animal protein, or liberal amounts of legume hays, such as alfalfa, has been found to be necessary for successful reproduction.

The work of Eckles, Becker and Palmer emphasized the essential nature of phosphorus in relation to reproduction in cattle. These authors pointed out, however, that sunlight and green feed were also contributing factors to the results obtained on their phosphorus-low rations. Theiler et al. likewise found that reproduction in cattle was disturbed when they were pastured on phosphorus-deficient pastures. Since cattle are a roughage-consuming species, they normally obtain relatively large amounts

of calcium through the hays ingested. Their chief need for a mineral supplement is one of additional phosphorus.

Iodine is needed by all classes of livestock in the goiterous regions. Iron, copper, and cobalt have also been shown to be required in certain regions of the United States, as well as in other countries. The lack of iron causes nutritional anemia or thumps in young pigs and it is necessary that supplementary iron be made available in their rations.

That manganese is essential in reproduction has been observed in studies on the albino rat. In recent investigations at the Wisconsin Station female rats on a manganese-deficient diet were shown to develop ovulatory arrhythmia, while male rats developed testicular degeneration which inhibited the formation of spermatozoa. Further, it has been shown in preliminary experiments with young, growing, and developing bulls that a ration of corn and timothy hay which contained 28 ppm. of manganese, while adequate for growth, was inadequate for good quality semen production. The same basal ration plus 52 ppm. of added manganese permitted the production of normal semen with active, viable spermatozoa.

Vitamin A — Among other physiological actions a lack of sufficient vitamin A is probably one of the outstanding causes of sterility among farm animals. With the Wisconsin Station having demonstrated that nutritional deficiencies caused reproductive failure in cattle as the result of a lack of calcium and vitamin A, it remained for Hart and Guilbert at the California Experiment Station to emphasize the importance of vitamin A in reproduction under practical conditions. They found in the range areas that lack of vitamin A was intensified by drought conditions.

Phillips et al. have shown that the vitamin A content of the blood plasma is rapidly decreased under practical farm conditions during the winter feeding period in Wisconsin and that the vitamin content of the blood can be maintained by the feeding of shark liver oil. The carotene and vitamin A stores are rapidly depleted during the six months feeding period following lush fall pasture. Several heavily producing cows on drought-stricken pasture during July and August, and lush pasture through September and October went into the winter feeding period low in blood plasma vitamin A, and subsequently developed a poor breeding record.

A vitamin A deficiency can be accurately diagnosed by blood analysis. Outward symptoms are shown by unthriftiness, rough hair coat, poor gains in weight,

and poor eyesight in semi-darkness. In order to avoid the effects of vitamin A deficiency in reproduction, bright green roughage of less than a year old must be used. A special effort should be made to obtain and feed bright green hay at all times and to use either grass, legume, or corn silage. In order to have corn silage of maximum carotene, or vitamin A, content it should be made when the corn is in the early dough state.

While this discussion on vitamin A has referred primarily to cattle, it is no less important for other livestock. Forty per cent yellow corn in the ration has been considered to be sufficient to satisfy the requirements for the vitamin A precursors. Recent observations may raise a question in this regard. Such storage factors as moisture content, type of facilities, and length of time stored are extremely important considerations in the preservation of the vitamin A potency of yellow corn. White corn has no vitamin A potency.

Hart and Gilbert have recently shown that the cow's nutritive status with respect to vitamin A may determine the success with which she may withstand infection with Brucella abortus. A literature review of vitamin A deficiency and requirements of farm animals was recently published by Hart.

Vitamin C or Ascorbic Acid—The Wisconsin Station has recently shown that ascorbic acid is closely related to successful reproduction. It is helpful in maintaining fertility in the bull, stallion, jack, and boar, as well as in the shy breeding cow and mare. It appears to stimulate the production of high quality semen with actively motile sperm, and to be necessary in ample amounts for certain early phases of pregnancy.

Farm animals usually synthesize their own supply of ascorbic acid and the rate of synthesis is conditioned among other things by the nutritive status of the animal with ample respect to vitamin A. Animals with ample stores of vitamin A are less likely to suffer from as ascorbic acid deficiency.

From research now available it appears that peak levels of ascorbic acid are necessary in the female during early pregnancy, and that the male likewise needs additional ascorbic acid at times in order to maintain breeding efficiency. Therefore, ascorbic acid treatment may be required in the occasional animal which is unable to synthesize enough ascorbic acid to maintain its fecundity. This can be given by mouth to the animal with a single stomach, but it must be injected subcutaneously in the ruminant.

Two grams of ascorbic acid per 1,000 pounds live weight should

be fed daily to the horse and proportionately less for swine. In cattle it is injected subcutaneously at the rate of two grams per animal every three or four days for three to six weeks. Bulls may be treated at any time, but cows should receive their first treatment on the day of heat, should then be bred immediately, and the treatments continued at three-day intervals for a period of three weeks.

Crystalline ascorbic acid is dissolved in boiled water (three-fourths of a level teaspoonful in two teaspoonfuls of water), or physiological salt solution, and injected at once. It should not be stored as it is readily destroyed by the oxygen of the air and by light. Veterinary supply houses prepare solutions of ascorbic acid which can be used directly. These are convenient, but unless they are prepared by reliable companies may not be stable in storage.

Some drugs, like the anesthetic chloretone, cause a rise in the rate at which the animal synthesizes ascorbic acid. It can be fed to cattle, but it should be used only under the direction of a qualified veterinarian.

Ascorbic acid therapy for sterility has been used successfully with heavily used mature bulls, developing young bulls, cows which come into heat at normal intervals, but fail to breed on repeated service, and on cows which apparently conceive but return on the forty-second or sixty-third day after breeding. Bulls respond in approximately nine out of ten cases, while cows will respond in two out of three, or four out of five cases, depending upon the type of sterility encountered.

An Opportunity for Poultrymen

Condensed from American Poultry Journal

G. T. Klein

THERE is real value in poultry manure as a fertilizer, and present conditions offer poultrymen an opportunity to cash in on this value.

As nitrogen fertilizers take their place on the "frozen" list, the chance has come to demonstrate the value of poultry manure. For the duration, at least, it will replace some of the commercial nitrogen now needed for gun powder.

Poultry manure has been selling for just what a poultryman could get for it. If he operated a general farm, the best possible use was on the fields. If it was offered for sale, the price depended on how badly the buyer needed it and how much he appreciated its worth. Sometimes it amounted to a contract with a vegetable grower or a dairyman to come to the poultry plant, clean the houses, and furnish new litter for the floor. That is a good proposition for both parties. The average selling price in Plymouth Co., Mass., during the spring of 1942 was $3.20 a cord. Prices have ranged from $3 to $5 a cord for the past 10 years.

A cord of manure is equivalent to about 3 tons or 100 bu., according to estimates of R. W. Donaldson, Extension Agronomist, Mass. State College. The moisture content of fresh manure will run about 75%. It may run as high as 85%. R. I. Red hens weighing 5.5 lbs. each will produce about 47 to 50 lbs. a year.

On the basis of a ton, it contains about 20 lbs. of nitrogen, 16 lbs. of phosphorus (P_2O_5), and 8 lbs. of potash (K_2O). Stable manure, by comparison, contains 10 lbs. nitrogen, 5 lbs. phosphorus and 10 lbs. of potash. The average plant food content of poultry manure is 1% nitrogen, .8% phosphorus and .4% potash.

Litter containing a considerable proportion of droppings will weigh about 48 lbs. to the bushel and straight droppings 60 to 70 lbs. per bushel. The litter manure weighs about 2 tons to the cord, and is considered to be worth about two-thirds as much as the straight droppings.

The plan of using "built up" litter is now a very common one. Litter is built up by adding one inch of dry sand to the cleaned floor, if it is available, and two inches of straw, peat, sugar cane, or shavings. The new pullets are housed on this in late August or September. It is added to from

Reprinted by permission from the American Poultry Journal, Chicago, Illinois

time to time, and by Dec. 1, it should be no less than 6 inches deep. It is stirred frequently, but is not changed during the entire year. It is nearly as valuable as straight droppings after a year's use, and the litter that was used is not objectionable except for the lawn. The floor manure will sell somewhat better if shavings are not used for litter, for there is some prejudice against them. The dropping pits, now so popular in the East, are cleaned about 3 or 4 times a year.

Poultry manure is lacking in both phosphorus and potash, but these can be supplied, for they are not rationed, and it can be made a well balanced fertilizer. It is a fairly common practice to throw some acid phosphate in the pits about once a week. This holds the ammonia in the manure and makes it a better balanced fertilizer. When applied to the land, some potash can be added. The superphosphate, which is often added to either the roosts or the floor manure, is used at the rate of about 30 lbs. to 100 hens a month. The use of a 0-14-14 fertilizer to balance it has been suggested.

Uses of poultry manure have been under careful investigation at Massachusetts State College and here are opinions of some of the investigators.

Lawns and golf courses.—Prof. Lawrence Dickinson. Poultry manure has always been one of the best fertilizers that one could get. It has the objectionable feature of burning, carrying undesirable litter, weed seed, and an objectionable odor. Well chopped straw is the least objectionable litter for the lawn as it blows away during the winter. Straight droppings are excellent. It can be put on late in the fall and as thick as the eye and nose will permit. Poultrymen can make it more valuable for this purpose by using desirable litters. Drying and processing make it excellent for the lawn and golf course, but have the tendency to make it too expensive.

Pastures and crops. — Prof. William Colby. Poultry manure is entirely satisfactory as a source of fertility. It is strongly recommended for grasses, but should be supplemented with phosphorus for clovers. It contains a variety of less common minerals which may be very valuable. The plant food is not so leachable as inorganic fertilizers. It is excellent for corn and can be used in almost unlimited quantities.

Fruits and berries.—Prof. J. K. Shaw.

Poultry manure is useful on any kind of fruit in moderation. It should be applied in the spring or very late fall. We look on it as a valuable source of nitrogen. If the hens' ration contains magnesium, it will be especially valu-

able for fruit. It is excellent for strawberries when applied the year before the crop is set. For raspberries, it should be applied in the early spring.

Vegetables.—Prof. Grant Snyder. It is absolutely satisfactory and does as good a job as any other manure. Manure with litter can be used in almost any quantity up to 16 or 20 tons to the acre. Straight droppings should be cut to 5 or 6 tons to the acre. It must be used more sparingly with peppers, tomatoes, potatoes, and other root and leaf crops.

Flowers. Flower growers in Massachusetts rate it very highly. It is spaded under in the spring at a reasonably heavy application rate and is used for both annuals and perennials.

It is very desirable to have some convenient way of handling manure at the time of house cleaning. The litter carrier is the easiest, and since pits have to be cleaned only 2 to 4 times a year, the carrier can be used to excellent advantage in houses of considerable length. At the end of the house can be a concrete platform on which the manure is dumped from the carrier. This might be enclosed and covered with a roof, but it is hardly necessary if the manure is hauled to the fields soon after cleaning.

Where the litter carrier is not a part of the equipment, the removal must be done through the open window or door in the front of the house. Modern houses are designed for this, and the cleaning program can be timed with the convenience of the hauling of the manure to the fields or the convenience of the one buying it. In many cases, it is thrown directly into manure spreaders or trucks and hauled to the fields.

The summer laying houses have doors 8 ft. wide, and the spreader is backed into the house for loading. One cleaning a year is all that is required.

Attempts to dry and package poultry manure by machine have not been very successful up to the present but it has possibilities. Some of the drying machines that have been marketed have been too light in construction and have not lasted very long. There is considerable expense on collecting manure from farms for a cooperative enterprise, which adds to the cost of the product. It is not impossible that there may be some successful attempts along this line after the war, but the product will probably have to compete with fairly cheap nitrogen fertilizers.

There has been some sale of the cleanings of the brooder house and laying house when peat or shredded cane are used for litter, which is commonly put up in 50 lb. bags and sold to the city flower grower after the product is air dried.

Pruning Abandoned Fruit Trees

Condensed from California Cultivator

Dooley P. Wheeler

IN 1911 I was asked for advice on pruning an apple orchard 50 years old and never pruned except by cayuses and long horns belonging to a squaw-man. Many would presume that these trees would be 50 feet high. Not so. They were better proportioned, more symmetrical and much larger in proportion than trees that had been pruned severely for 20 years, more or less. My instructions to the pruners were: "Remove the long pole limbs except where one is needed for shade or shape, and the cross, damaged or spent limbs. Prune according to vigor on each branch and remove not more than 10 per cent of the limbs, by weight. Make the cut just outside the raised area at the base of each limb and on a line parallel to the branch from which it is being cut. Coat every wound with warm grafting wax." By such moderate pruning for nine years the trees and quality of fruit were improved.

I once pruned a 30-acre apple orchard in Mariposa County that had been neglected for eight years or more, and then was cut back severely, the way a gardener treats a privet hedge. The rank sucker growth reached a height of 20 feet in the struggle for sunlight and crowded out all inside fruit wood. Many trees in this orchard died as a result of this wood butchery. I have seen much damage in orchards and vineyards in the San Joaquin Valley from less severe pruning, though excessive. I thoughtfully planned a five-year pruning program on this orchard. The first three years, the pole limbs or upright branches, were gradually removed from each scaffold limb according to vigor and from different areas so that a uniform stimulus would be maintained. As pole limbs were removed, side twigs which bear fruit, and larger side branches, began to develop. Many walnut and olive groves would be improved by a similar treatment. At the beginning of the fourth year, heading back to side limbs was begun, the goal being to produce the crop so that it could be harvested by hand from 12-foot ladders. Upright growth 10 to 20 feet long was removed. Where insufficient lateral twig growth had developed to take care of the sap flow, the limb was cut higher than the height desired and this forced growth below.

Reprinted by permission from the California Cultivator, Nov. 14, 1942

Olive and walnut limbs are not cut back, but enough long pole limbs should be removed to admit light to develop side twigs. A long twigless limb does not produce many fruits or nuts.

If a vineyard has not been pruned for a year or more, gradually work back to the desired or customary size and shape for that variety in the community.

Whether making a delayed or annual pruning of hydrangeas, bush roses or climbers, prune back sufficiently to obtain strong annual growth at or near the ground.

Citrus growers and scientific experts say that citrus will stand somewhat severe pruning. They advise cutting back to good live growth but not enough to cause excessive sucker growth. If three-fourths of the roots are destroyed by poor drainage, which frequently is the case, three-fourths of the top should be removed.

Handling New Feeder Cattle

Thousands of feeder cattle are now moving into the feed lots of this area without losses or serious setbacks, because of safer transportation, skilled veterinary service, and sanitary methods of feeding and handling by market men and farmers. Travel sickness, shipping fever, hemorrhagic septicemia, pneumonia, flu, can be avoided.

In line with increased livestock production and conservation of meat, many dependable truckers load cattle quietly, do not overcrowd animals, partition heavy loads and mixed shipments, and keep trucks clean and well bedded with fine sand.

Upon arrival at the farm, cattle are given a rest and provided with clean hay in clean mangers where all litter and old feed has been removed. Oats and soda are the first new feeds offered the cattle by many successful feeders. After a few days, other grains and concentrates are fed sparingly. Plenty of time is taken to get cattle accustomed to full grain rations. Alfalfa and clover are fed with more care to new cattle and pastures are used only for short periods in the middle of the day.

Vaccination is often a question in the mind of the feeder, but average farm experience indicates the need for consultation with a practical veterinarian before administering any treatment to feeder cattle. If any animals become weak, unthrifty or sick certainly they need skilled attention. —Harry J. Boyts, Livestock Commissioner, Sioux City, Iowa.

—Dakota Farmer

Clover Pastures for the Coastal Plains

Condensed from Better Crops With Plant Food

R. E. Blaser

Florida Agricultural Experiment Station, Gainesville, Florida

GROWTH of pasture plants on many Coastal Plain soils is limited primarily by the low fertility level of the soil. The soils are primarily deficient in nitrogen, phosphorus, potassium, and calcium. Recent tests also show that certain of the minor elements may become limiting growth factors on some soils after lime and complete fertilizer have been supplied.

Nitrogenous fertilizers are the most expensive nutrients required for pastures, and plant growth is often limited primarily by the deficiency of this element in the soil. The best method of supplying nitrogen to pastures is through a legume program. Legumes, such as clover, possess root nodules which fix nitrogen from the air for themselves and also add nitrogen to the soil for associated grasses. The herbage of pastures which are made up of a mixture of grasses and legumes is higher in minerals, protein, and vitamins than herbage from grasses alone.

Legumes should also be used for pastures to aid nitrogen conservation in connection with the war effort.

The purpose of this writing is to discuss briefly methods used for growing and perpetuating clovers in Florida.

The Coastal Plain soils which are best adapted for growing clovers include low moist soils with six inches or more of dark surface soil, high in organic matter. The fine-textured soils are preferable to the coarse-textured soils. Soils in these categories have a higher base exchange and water - holding capacity than sandy soils low in organic matter.

The variety to plant depends primarily upon soil moisture conditions and to a limited extent on soil texture. Louisiana white and Persian clovers furnish best grazing on low moist soils which may be considered too wet for cultivated crops. These soils are generally high in organic matter. California bur, Black Medic, Crimson, Hubam, and other sweet clovers grow best on soil which is fair to well drained. Hub and Hubam sweet seem to be widely adapted and Black Medic

Reprinted by permission from Better Crops With Plant Food, Washington, D. C., Oct., 1942

and Hubam sweet clover are more drought-resistant than other clovers. It is advisable to plant a mixture when it is not known which clovers are best suited to the environment in question.

The lime and fertilizer practices for establishing clovers depend upon the variety. The clovers may be divided into two groups from the standpoint of fertilizer requirements. The Medicago-Melilotus group (Black Medic, Hubam and other sweet clovers, and California bur) requires more calcium but less phosphorus than the Trifolium group (White, Crimson, Red, Hop, and Persian clovers). Since the Medicago-Melilotus clovers require more calcium than the Trifoliums, ground (Calcic) limestone has been more satisfactory than dolomitic limestone for this group. The Trifolium clovers may be fertilized with either dolomitic or calcic limestone at the rate of one ton per acre. White, Persian, and other Trifolium clovers treated with high calcic limestone have generally given as good or better growth than those which received dolomitic limestone. The varieties of either the Medicago-Melilotus or Trifolium groups were higher in calcium content when treated with ground limestone than when treated with dolomite.

Liming is also necessary because it improves nodulation. Without lime Medicago-Melilotus clovers were very poorly nodulated, but the nodulation of the Trifoliums was also improved greatly when lime was applied. The Medicago-Melilotus clovers invariably fail in the absence of lime, and the Trifoliums fail on the more acid soils when lime is not applied. Lime has stimulated growth greatly on all soils tested with the exception of the Parkwood series, which is generally underlaid with marl. The element magnesium, supplied by dolomitic limestone, has not yet been found to be a limiting growth factor.

In addition to lime, clovers require phosphorus and potash. Four hundred to 600 pounds per acre of 0-14-10 or similar fertilizer has supplied the phosphorus and potassium needs satisfactorily. For Medicago-Melilotus clovers the P_2O_5 may be reduced if desired.

When phosphorus was omitted from the lime and fertilizer treatment, the clover plants were extremely dwarfed and purplish-green in color (Phosphorus-deficient). These plants were also low in phosphorus content when compared with plants that received phosphorus.

The omission of potash from the lime and fertilizer mixture resulted in potassium-deficiency symptoms and inferior growth. Potassium - deficient plants of

white clover possessed spotted leaves and the leaf margins were brownish when potash deficiency in the soil was acute. The potassium-deficient leaves of California bur clover were yellowish and also had burned leaf margins, but leaf spotting was generally absent.

The fertilizer practices on soils that have been fertilized before establishing clovers depend upon the fertilizer applied for previous crops. Fair to good clover growth may be anticipated without fertilization on heavily fertilized soils that have been used for truck crop production. However, these soils have generally been found to be high in phosphorus, thus the clovers responded primarily to lime and potash on these soils.

The Trifolium and Medicago-Melilotus or related clovers do not occur naturally on the Coastal Plain soils. To avoid failures it is thus necessary to inoculate all clover seed thoroughly. Tests show that inoculation rates at five times the rate recommended for commercial inoculants give rapid nodulation and thus excellent stands and growth of clover the first year it is planted. The desirability of using heavy inoculation rates is substantiated by the good results which have also been obtained by farmers when following this technique.

The following inoculation technique has been recommended and used by farmers. Syrup is added to seed and mixed until all the seeds are coated. The proper culture is then added and mixed thoroughly, after which peanut or cotton-seed-meal is supplied until the seeds separate. If clovers requiring two kinds of culture are used as a seed mixture, they should be inoculated separately to concentrate the bacteria on the seed of its symbiotic host.

Prevailing soil moisture conditions during seeding time influence nodulation greatly. To insure good nodulation the soil should be moist and well packed before planting clovers. Plantings made in dry soil with prolonged dry periods have failed because of inferior nodulation. In Peninsular Florida clovers grow successfully if planted any time when the soil moisture conditions are favorable, within the period of October 15 to January 1.

If the clovers are planted during apparent favorable moisture periods and the soils turn very dry, it is advisable to reinoculate the clovers. Clovers that have already been planted may be reinoculated by sieving soil which has grown clovers and adding commercial culture. The fineness of the mixture aids dissemination so most of the seedlings are contacted with the culture. Such a mixture was broadcast from a truck during a rain at the rate

of 500 pounds per acre on clover planted during a dry period. The resulting growth and nodulation of clovers was excellent.

Clovers may be seeded on newly prepared seedbeds or on established grass sods. On newly prepared seedbeds best growth occurred when the seedbed was prepared well in advance of planting time to allow time for the soil to become firm. Surface broadcast seed planted during a rain or seeding with immediate rolling has given excellent growth.

Excellent stands and growth of clovers have been obtained on test plots and farms when seeded on established grass sods without disturbing the grasses. When this planting technique is followed, the grass should be closely grazed and the seed broadcast during a rain. Failure resulted when the grasses were not closely grazed.

Of the many clovers tested, white clover is the most important variety. Louisiana white and Ladino clovers produced higher yields than other clovers. Ladino is not recommended because it does not reseed itself satisfactorily. Strains of white clover from England and New Zealand were found to be dwarfed types and low in productivity. Several white clover strains from the northern part of the United States were found more vigorous than the imported varieties, but these were inferior to Louisiana white. Recent tests also show that other clovers in a species group differ greatly in growth, characteristics, productivity, and behavior.

Clovers, like other crops, require certain definite fertilizer and management practices. Annual top-dressings of fertilizer have proved necessary on some soils and desirable on others. Two hundred to 400 pounds of 0-14-10 or similar fertilizer applied annually produced earlier grazing as well as more feed. The herbage of clover which was fertilized annually was also

Table 1—The Chemical Composition of Clovers is Improved Greatly by Frequent Fertilization*

Lime and Fertilizer Treatment Pounds Per Acre—1939	Chemical Constituents in Per Cent of Dry Matter				
	Calcium	Phosphorus	Potassium	Magnesium	Protein
None	1.03	0.29	1.33	0.43	22.6
500 pounds ground limestone and 150 pounds 0-16-8	1.43	0.38	1.62	0.43	27.6
1,000 pounds ground limestone and 300 pounds 0-16-8	1.48	0.46	1.84	0.46	28.2

*All plots were fertilized uniformly with 1 ton dolomite and 600 pounds 0-16-8 fertilizer in October, 1937.

Note: The soil was a virgin Leon fine sand.

higher in calcium, phosphorus, potassium, and nitrogen than the unfertilized clover.

The best grazing management practices of clovers are not definitely known, but it appears that grazing in late winter or early spring should be withheld until the clovers are well started (two to four inches in height). Light grazing during June facilitates seeding for next fall's volunteer growth or for harvesting of a seed crop. In the fall the sods should be in a closely grazed condition so grasses do not compete with the volunteer clover plants and seedlings.

In October 1940, a 10-acre area of carpet-grass pasture was divided into four pastures of two and one-half acres each. Two of the pastures were fertilized and seeded with a mixture of Louisiana white, Black Medic, and California bur clovers. Because of the dry season the clovers were not ready for grazing until April 1941. These two clover pastures produced an average of 330 pounds of beef per acre in 1941. In November 1941, these two clover pastures were refertilized with 300 pounds of 0-16-8 fertilizer but were not reseeded. Beef production this season is much higher than during the first year.

The remaining two carpet-grass pastures were fertilized with 400 pounds per acre of an 8-8-5 fertilizer in the spring of 1941. These two carpet-grass pastures, without clover, produced an average of 118 pounds of beef per acre in 1941.

The high gains of steers grazing on the clover-carpet grass pasture may be attributed primarily to the quantity of feed produced and to the high calcium, phosphorus, protein, and vitamin content of clover as compared to carpet grass. The relative chemical composition of carpet grass and white clover shows that clovers are approximately three to four times as high in calcium, and one and one-half to three times as high in phosphorus, potassium, and protein. It is known that the chemical composition of plants is affected greatly by fertilization and growth stage.

The good cattle gains on a clover-carpet grass pasture may also be attributed to the effect of clovers on the nitrogen content of the associated grasses. Table 2. The average protein content of carpet grass in the absence of clover during August was as low as 7.23% as compared to 9.89% protein in the presence of clover. Carpet grass is generally higher in protein in the spring, thus the increased protein content of carpet grass growing in association with clover is especially significant.

The grasses growing in associ-

Table 2—Lime and Fertilizer Produce Good Clover Growth and Increase the Protein Content of Carpet Grass*

Fertilizer Treatment 1937	1939	Per cent Protein in Carpet Grass†	Clover Growth
No Fertilizer	.....	7.23	Very poor
600 lbs. 0-16-8	½ initial	8.19	Poor
1 ton Lime and 600 lbs. 0-16-8	½ initial	9.48	Very good
1 ton Lime and 600 lbs. 0-16-8	¼ initial	9.89	Very good

*Clover grew primarily during the period of February to May, 1940; Carpet grass was plucked for analysis on August 6, 1940.

†The mean differences are highly significant according to the "F" test.

ation with clovers were stimulated greatly due to the nitrogen supplied to the soil by the clovers. Although clovers made most of their growth during the period of February to June, the effect of clover on stimulated grass growth was still evident in September and October. The grass grown in association with clovers also maintained a much greener color than the grass grown in the absence of clovers.

In conclusion, the need of legumes for improving pastures should be emphasized. To grow pasture legumes fertilization, inoculation, seedbed preparation, date of seeding and fertilizing, management, and planting of adapted varieties are factors that must be carefully considered.

Pastures should receive as much consideration as field crops. Properly managed pastures are profitable pastures.

Cattle Hides—An Essential War Commodity

Condensed from The Cattleman

C. D. Lowe
Senior Extension Animal Husbandman

M. P. Jones
Senior Extension Entomologist

U. S. Department of Agriculture

THE greatly increased leather requirements for our all-out war effort place a large responsibility upon the domestic production of cattle hides. This is especially true of the types of hides suitable for heavy leather production. Although we have been engaged in this war as a belligerent for less than a year the tremendous demand for leather and the ocean shipping situation affecting imports are such that a real shortage of heavy leather in particular is imminent. Shoe soles for our fighting men, scabbards, belts for driving our war industries, harness and many other essential leather articles are made from the thickest part of the hide—from along the back and side of the animal. And unfortunately those parts of the hide ordinarily are most seriously damaged by brands and grub holes. The loss from these two causes runs into millions of dollars annually. Few persons realize that about 7 per cent of the weight and 11 per cent of the value of the animal is in the hide. And there are other causes of hide damage such as horns, handling and shipping injuries, warts, screw worms, mange, ticks, lice, ringworm, etc., but they are minor as compared with the cattle grub and branding.

In an effort to decrease the damage to hides and thus conserve a product of essential value for war uses various agencies of the Federal Government have undertaken to devise ways and means to bring about improvement in the current situation.

The packing industry reports that about 40 per cent of the hides carry brands, and the hide value loss from this source alone amounts to some $3,200,000 a year. But there is another side to this question. The practice of branding serves a very definite purpose in the raising of cattle under range and semi-range conditions. Brands are the principal marks of cattle ownership employed in the range country. They serve to identify the cattle to the owner, they are the legal evidences of property rights. In

Reprinted by permission from The Cattleman, Oct., 1942

many instances they are recognized as trademarks with definite commercial value, and some state laws require the branding of livestock run on the range. Other states go further and forbid the slaughter of unbranded animals and practically all Western States require the keeping of a record of brands of animals slaughtered. It is therefore obvious that the opportunity for decreasing the incidence of branding is not simply a change in practice on the part of an individual operator. In view of these conditions the problem assumes complexity but should not be considered insurmountable if the desire for improvement is sufficiently strong on the part of all interests concerned. It is not to be assumed that a complete discontinuance of the practice of branding is the desirable goal in this field of hide conservation, but there is no valid argument in behalf of branding where it serves no economic purpose.

The possibilities in decreasing hide damage as a result of branding may well be grouped under five headings, as follows: (1) discontinuance of branding where it serves no economic purpose, (2) use of smaller brands, (3) change in location of brands from the more valuable to the less valuable parts of the hide such as the jaw, neck, shoulder or thigh, (4) use of open design brands and of wide-faced branding irons, (5) modification of outmoded laws, regulations and other formal restrictions which interfere with constructive improvements in the whole field of livestock branding.

Definite and concerted interest and action on the part of an informed cattle industry can and will find ways and means to overcome existing obstacles to a reduction in hide damage due to branding.

The damage from cattle grubs is a large contributing factor affecting the quality of hides, before they are taken from the animal. In addition to the damage to the hide, the grubs spoil some of the choice cuts of meat along the back where the grubs encyst. Records from a packing plant in 1940 revealed that an average of two pounds of beef per carcass were trimmed from the loins and ribs of about 75,000 head of grubby cattle slaughtered that year. On this basis, grubs in the cattle received by one packer robbed the armed forces and civilians of 150,000 pounds of meat which is so vital to the war effort. This 150,000 pounds of meat destroyed could be multiplied many times over if all the packers in the country were taken into account. Aside from the loss of meat trimmed, the loins and ribs were devalued two cents per pound.

When it is recognized that the packer loses an average of $3.56 per head on grubby cattle, it is easy to understand why some packers devalue "grubby" cattle from 50c to $5.00 per head, depending on the number of grubs present. Another loss associated with cattle grubs is that occurring during late winter and spring when the cattle grub flies cause the cattle to stampede and in their mad rush for shelter, they run off much flesh and are deprived of normal feeding. Some animals are often injured or killed in the fracas.

Cattlemen who are aware of the losses due to cattle grubs are more interested in preventing such losses, especially if preventive measures are economical and easy to apply. Interest in control is usually greater when the flies are causing the cattle to run, but the entomologists have not found a satisfactory way to combat the flies. However, this insect, like all others, has a definite life cycle and vulnerable point somewhere in its cycle. If one studies the life of the insect that point will be found.

In the extreme southern part of the United States the adult flies begin to emerge during the warm, sunny days of winter, and continue emerging until early spring. The appearance of the flies is progressively later as one moves northward, taking place as late as June along the Canadian border. Within a day or so after the flies appear, they start laying their eggs on the heels of the cattle. It is the presence of the flies around the heels that annoys the cattle. The eggs are attached to the hairs on the cattle's heel, and so far as is known there is no irritation from the flies laying their eggs. Sometimes the eggs are laid higher on the hind legs of cattle.

After a few days the eggs hatch and the small maggot crawls down through the hair and burrows into the skin. This entry produces itching and causes the cattle to take an awkward stand and to lick their heels. After penetrating the skin, the maggots work their way through the muscles of the legs and forward through the body as far as the chest cavity. After seven or eight months, the maggots come to rest beneath the skin on the backs of the cattle. Soon after they arrive in this position, they make a small hole through the skin and remain just beneath the skin from one to three months. During this period the maggots (grubs) cause large areas of yellowish, greenish jelly-like spots in the flesh which have to be trimmed from the carcass in slaughtering.

While the grubs are located in the back, they are more vulnerable to control measures than at any other period in life of the in-

sect. It matters not at which stage the insect is killed, because the break in the life cycle at any place disrupts its perpetuation. The important point is to make the break as complete as possible.

Rotenone powders applied to the backs of cattle have proved to be the most satisfactory control measure for cattlemen to use. They can be applied in the form of a spray, wash, or dust. The method of application will depend on the number of cattle to be treated and the equipment available. The spray composed of 5 pounds of either derris or cube powder, containing 5 per cent rotenone, and 10 pounds of wettable sulfur to 100 gallons of water, should be applied with a powered sprayer capable of developing at least 250 pounds of pressure. This method of application is admirably adapted for quickly treating large range herds in an ordinary cattle chute. An average of about 200 head of cattle can be treated with 100 gallons of spray.

Where powered sprayers are not available, the rotenone powders can be applied as a wash consisting of ¾ pound of either derris or cube powder, and 2 ounces of soap, or ½ pound of wettable sulfur, per gallon of water. It is applied with a sprinkler made of a fruit jar with holes punched in the lid and thoroughly rubbed into the hair with a scrub brush. One gallon of the wash will treat an average of 16 cattle.

Except in the Northern States, where the coat of the cattle is heavy, powders containing 5 per cent rotenone and equal parts of wettable sulfur by weight dusted on the backs of the cattle and worked down into the hair have given control equal to the wash or scrubbing method.

Cattle growers are in position to make a definite contribution to the serious need for leather by better control of the cattle grub and by decreasing the damage done to hides by branding. By so doing they will be rendering a genuine service to the Nation in a period of great emergency.

Jacks and Mules

Condensed from The Rural New-Yorker

R. W. Duck

NUMEROUS breeds and types of donkeys, burros and jack stock have evolved and been produced by selective breeding from the early strains descended from the wild ass.

It is possible to breed jennets to small stallions; the resultant hybrid offspring, called a hinnie, lacks commercial value, and is also sterile.

The American or Mammoth Jack is a breed produced by careful constructive selective breeding from the jack stock imported in earlier times, and representing amalgamation of the five principal foreign breeds. These include the Catalonian from the Pyrenees of Spain and France, the Poitou or hairy jacks from France, the Maltese jack, first imported from the Island of Malta, the Andalusian originated in southern Spain, and the Majorca from the Island of the same name.

American jack breeders have successfully combined and concentrated many of the strong points from each of the breeds mentioned, at the same time eliminating most of their undesirable characteristics. The standard height of the American jack at maturity is 15 to 16 hands, weight 1,000 to 1,200 pounds, heart girth from 65 to 72 inches, and cannon bone at smallest circumference eight to 10½ inches.

With the advent of World War I the price of mules advanced materially, with consequent demand and favorable prices for good jacks. At its termination local markets were considerably overstocked with total numbers in the United States of over five and one half million head. Consequently average farm value per head dropped from $148.25 in 1920 to $88.99 two years later. The average low spot of $60.42 was reached in 1933, for a total of 5,046,000 head. Since then numbers steadily declined and prices have advanced. The present estimated number of mules in the United States is approximately 4,321,000 head; this is a decline of about 1½ per cent from the previous year. However, due to increased domestic and foreign demand incident to World War II, and general economic improvement, the number of mule colts foaled in 1939 was the largest since 1927.

In discussing mule and jack stock market considerations Secretary Wayne Dinsmore, Horse and Mule Association of America, Chicago, Ill., states that the average life of mules is 18 years, under favorable conditions; but so few have been raised since 1924, that the advanced age of mules now living, and the poor care, feed and management many mules in southern states receive, makes it reasonably certain that at least one-tenth of the total die each year, in most southern states. War purchases and replacements are, of course, subject to heavy casualties during hostile engagements. Figuring from the census data on mule colts under two years of age, it is found that where we need 52 mules coming for replacements, we have but 11.

Due to the economic factors mentioned, jack and jennet breeders between the years 1920 and 1932 found themselves without a market. Secretary Dinsmore mentions the fact that these animals, seldom worked because of little use for work, became a bill of expense. Eventually, thousands of them were shot and fed to the hogs to stop further expense. The inevitable result was that only five years later, after the low point of 1931, when good jacks were sold for $5 each and used for hog feed, jacks that are no better are bringing from $500 and up, and jennets are so scarce there is no chance of producing as many jacks as we need for several years.

A good quality mare which stands 15½ to 16 hands high, weighs 1,200 to 1,400 pounds, preferably carrying some standard bred or saddle horse blood, will, if settled to a good registered American jack, be capable of producing a mule colt which at maturity will stand from 15 to 16 hands high, weigh from 1,100 to 1,400 pounds, and carry the necessary style, action and quality to sell readily at top market price. Based on young mules and present breeding operations, the following 10 states lead in the production of mules: Texas, Missouri, Oklahoma, Tennessee, Kansas, Kentucky, Arkansas, Illinois, Nebraska and Mississippi.

Indicative of the upward trend in jack stock prices was the purchase in 1938 of the great jack, Limestone Valley Gold Dust 29619, for $5,000, by Mr. J. C. Penney from Col. L. M. Monsees, of the Limestone Valley Farms, Smithton, Missouri. This jack is now in stud service at Hamilton, Missouri.

It is necessary for young jacks to be properly handled and trained or they will not serve mares when of breeding age. Such jacks which will cover only their own female species are

sometimes referred to as "jennet jacks," while those properly broke and trained for mare service are called "mule jacks." Due to the jack stock depression, many breeders neglected to properly train and handle their young jacks. This situation is also a contributing factor to the present shortage of good "mule jacks." Matters relative to care, breeding, management and handling of jack stock are so important in order to make a success of this business that both Secretary Dinsmore and Secretary Morton conducted surveys concerning these practical questions.

Jennets should not be bred until three years old. They have to be tried with a jack, by leading him around in the lot or paddock among them and if any of them are "in season" it becomes evident. A jennet "in heat" should be separated from the rest, put in a safe box stall, left there for a day or night, then bred and kept in the box stall or in a separate pasture where there are no other jennets, until she is out of "heat." She may then be turned back with the jennet herd. She should be tried again in 18 or 21 days and if "in heat," should be bred as before. Jennets should be handled in this way through the season, from the first of April until November. After they all seem to be in foal, trying every 10 days or two weeks is sufficient. Jennets are harder to settle than mares and only careful attention will prevent a light foal crop. Jennets carry their young 12 months and sometimes longer, so when a jennet foals late in the Fall it is best not to breed her until the next Spring.

The same general rules relative to foaling and care of the new born colt must be observed as with horses. Good pasture and oats for the jennets nursing foals, with a creep for the foals is desirable. At weaning time it is especially important to separate the jack from the jennet colts. Jack colts should never be permitted to associate with jennets or mules after being weaned. Just after being weaned breeders recommended that a stud colt of good disposition be placed with the jack colts, and kept continuously with them until they are about two years old. At this age jacks become rough in their play and should be separated, each being allowed a separate box stall and paddock. They should be fed oats, wheat bran, good hay or fodder, but little or no corn.

The young jack is now ready for service, and if properly handled and trained will become a good mule jack. Without exception successful jack breeders recommend that his first service be to a very gentle mare, preferably of small stature, or that a pit be dug, and that the mare be

positively "in heat." If the mare is shy or fights the jack, she may injure him and thus cause him to become afraid of trying to breed mares. There is no species affinity between jacks and mares; in fact in many instances there is considerable repulsion. Some breeders find it facilitates matters and helps to break in the jack to rub jennet urine on the tail of the mare which is to be bred. It is desirable to breed the jack back after this initial service in a day or two to the same mare.

It has been found that jacks serve mares much more readily if they are not allowed to tease mares prior to service. A stallion should be used for this and then taken away; the jack is then brought out and held back from the mare until ready for service.

Strong, flat, hard, flinty bone is a necessary requirement with jack stock as well as mules. To attain its maximum possibilities the breeding as well as growing jack should receive from two to three per cent of ground limestone in his grain feed. It is important to keep their feet properly trimmed at frequent intervals or they will become turned and cause crooked legs to develop. Due to the fact that jack and jennet colts have heavy coats of hair, they may become lousy; they should be examined frequently to see if such a condition exists, and if so receive proper treatment and preventive measures.

Where it is desired to raise mules on rather an extensive scale, or to follow the practice of range breeding mares, the practical problem of getting the mares in foal to a jack from pasture breeding presents some real difficulties. If a jack is placed with a band of range mares which have not been properly prepared and trained he will get few if any colts, and may receive injuries of a serious nature from the mares. Breeders have found the solution to this problem is to raise a good stud mule to the age of about two years and then turn him in first with the range or pasture mares. A stud mule as previously mentioned is sterile and will not get the mares with foal; however, he is more active than a jack and a certain and positive performer. The mares thus become used to such service from an animal of the same general appearance as the jack. If the stud mule is turned with the mares early in the season and removed in about 12 weeks, to be replaced by a jack, a high percentage of mule colts may be obtained. In about eight or ten weeks the jack should be replaced with a stallion, so that mares still open may conceive and thus produce a horse foal.

Hemp — Our Forgotten Crop

Condensed from Missouri Ruralist

MISSOURI may be called upon to again take up the production of what was once our greatest farm crop, but is now all but forgotten—hemp. The United States Department of Agriculture is planning a hemp-growing campaign to plant 300,000 acres of the fiber crop in the nation next year.

Whatever part Missouri may play in this program, we can boast that we once grew hemp inferior to none. In fact, our pioneer agriculture was largely based on hemp and many early fortunes were made in hemp and tobacco.

History is repeating itself. About 1825, the United States Navy attempted to stimulate the production of hemp for use in making rope. Today our armed forces are again in need of rope and the hemp fiber is to play a vital part in our war effort. It is also to be used in making bagging.

So badly is hemp fiber needed that our Government is planning to erect about 71 hemp mills, each mill to serve about 4,000 acres of hemp in a radius of 15 miles. Materials for these mills have been given a high priority rating.

The industry is so old that even the old timers cannot tell us too much about it. Hemp came to Missouri with the first real farmers. As far back as 1821, Isaac N. Bernard advertised hemp seed for sale in the "Missouri Intelligencer." In 1826, advertisements appeared in the same paper offering to pay cash for hemp, at the rate of $4 a hundred.

In Saline county there remains a relic of the hemp industry—a press or baler, which is said to have been built in 1831.

The hey-day of the hemp industry in Missouri was in the '40's and '50's of the last century. That is when the crop really assumed a great importance. The river ports saw steamboats take load after load down the river on the way to St. Louis and New Orleans. In 1849, there were 1,470 tons of hemp shipped from Lexington. The inland town of Fayette also was a center for hemp buyers, as indicated by advertisements in the Fayette papers.

Hemp in the early days required a good soil—and it still does. It required a "ground which did not hold water on the surface after heavy rains and in drouth did not bake or crack, but was moist within 2 or 3 inches of the surface."

Reprinted by permission from the Missouri Ruralist, Oct. 24, 1942

One practice was to plant the hemp in succession plantings so that it would not all mature at the same time. It was planted from April 25 to May 20. From 4 to 5 pecks of seed to the acre were sown. Hemp planted for the seed was grown in a field by itself, and handled much like corn, with 8 to 10 seeds to the hill being planted and later thinned to 3 or 4 stalks. Good seed was very important.

When grown for fiber the plant grew about 12 feet tall by harvest time, and the stalk was one-fourth to three-fourth inches in diameter. It matured in August and was cut when the seed was in the milk.

Hemp was usually cut with a cradle, and a good man could cut about an acre a day. About a half acre a day could be cut with a hook. Later, improved cutters were introduced.

The hemp was allowed to lay on the ground for some time, then put into shocks in October. Missouri farmers seldom stacked their hemp. There were two methods of rotting the hemp for removal of the fiber, the dew-rotting method and the water-rotting method. Dew rotting consisted of letting the dew in the fields rot the stalk, and this was the practice most commonly followed in Missouri. Water rotting was carried out in tanks of warm water, but never was a common practice in this state.

The hemp was taken up about Christmas and then even more hard work was required. The fiber had to be broken out of the rotted stalk by hand. The fiber was then twisted into "hands" and baled in a press. A good day's work breaking out the fiber was from 100 to 200 pounds. This breaking was done chiefly by slave labor and the value of a slave was sometimes estimated by the amount of hemp he could break. The bales of hemp were shipped by steamboat.

The main hemp market was in Boston and the United States Navy made purchases there.

Hemp acreages continued to grow in Missouri until the Civil War. The biggest year was in 1860, when the production of the state was 19,267 tons.

Following the Civil War the proud hemp industry virtually disappeared from Missouri. None has been reported since 1890.

One relic of the industry is the widespread wild growth of hemp, commonly called Marijuana. This plant will not do for hemp fiber production.

Improved varieties of hemp are being grown for the new program. This year seed is being grown in Kentucky. The present hemp industry is located in Wisconsin, but the season there is too short to mature seed.

Benefits from 4H Club Work

Vernon Pellet

Prize Essay Winner — Viola, Wisconsin

4H clubs are organized groups of rural American youth, who are cooperating to prepare themselves for the future farm life they plan to live. A large percentage of the fifteen hundred thousand boys and girls who are annually enrolled in 4H club work have greatly benefited themselves by this training.

As a 4H club member, I have received an unmeasurable amount of experience. In 1934 as a boy of ten, I joined a 4H club. That year's work created a great enthusiasm for me to continue. My project was a purebred Jersey calf. The ownership of this animal gave me a deep pride and this was the real beginning of my 4H club career. The next year I enlarged my project to two calves. The herd I now own is centered around these two animals and their offspring.

Last year, 1940, I had a herd of four milk cows, two heifers, and one bull calf. The beginning value of these animals was five hundred and fifteen dollars. The equipment that I already had on hand was valued at three dollars and ten cents. The four milk cows produced nine hundred eighty-four pounds of butterfat on twice a day milking during the project year. The total amount of butterfat for the full year was one thousand two hundred eight pounds. The total amount received for the project was two hundred seventy-nine dollars and ninety-four cents.

While the younger animals were not producing, they were gaining in value. At the end of the project year they were valued at five hundred thirty-five dollars. The equipment depreciated to a value of two dollars and ninety cents. Other cash expenses amounted to nineteen dollars and ninety cents. The amount of feed consumed was valued at one hundred twenty-six dollars and forty-three cents. Other cash receipts amounted to twenty dollars.

In order to completely achieve, I had to make a public showing of my projects. Having been to the Wisconsin State Fair before, I again went there to exhibit my purebred Jerseys. I exhibited five animals and received three blue ribbons and two red ribbons. The cattle were judged and placed in groups according to their classification.

At the Richland County Fair, I again received a share in the winnings. The premium money amounted to a total of seventy-

six dollars. I worked two hundred eighty-nine hours and forty minutes in caring for my cattle. This amounted to a labor cost of forty-six dollars and sixteen cents. A profit of one hundred ninety-nine dollars and twenty-one cents was realized on my enterprise after deducting the expenses from the receipts.

Another activity I undertook last year was a sheet-metal demonstration. Walter Fetty, a neighbor boy and a fellow 4H club member, and I prepared a demonstration with the aid of Mr. A. V. Miller, our Richland County Agricultural Agent. The demonstration dealt with the application of regular size sheets of galvanized metal on a model of a normal building. Through hard work and many hours of drilling we advanced far enough to tie with another demonstration team of our district. In August, we competed in the Wisconsin State Sheet Metal Demonstration Contest at the State Fair. We won this state contest and received twenty-five dollars toward expenses of a trip to the National 4H Club Congress at Chicago.

On the last Saturday morning of November, Walter and I boarded a train and headed for Chicago to attend the Club Congress. That week at the Club Congress is a highlight of my life that I will never forget. Some of the most interesting events of the trip were the International Livestock Show, Thomas E. Wilson Day, the annual 4H Banquet, and a trip through the Swift and Company packing plant.

I think 4H demonstration work is one of the greatest and most beneficial types of activity that a member can undertake. It teaches one cooperation, speaking, and public appearance.

Livestock projects prepare young people to take over the farm operation of the country in the future. I have received much valuable experience raising livestock, fitting them for show, and showing them. For the past three years I have helped manage and show my father's herd.

In 1941, I continued my dairy projects. This year I also raised Hybrid seed corn under supervision of a grower in my community. I did all the work and sold the seed to the commercial grower. I caponized fifty cockerels as another project this year. The capons were sold on the Christmas market as first class birds.

In this time of the National Emergency, we are preparing to help in every way we can to increase production of farm commodities. 4H members are going to have to supply much of the farm labor next year. The expansion of 4H clubs and projects will greatly help to supply the nation with food.

Copra

Condensed from Pennsylvania Farmer

C. Meehan

WHEN seaways were open the United States imported above 500 million lbs. of copra annually. Most of this oily mass came from tropical Pacific islands. Processed here, a highly valuable edible oil and copra meal resulted. The meal went to livestock. The coconut oil found a myriad of uses, its versatility enabling it to serve a multitude of crafts and sciences.

With the supply stream cut off, stocks of copra in this country are being rapidly depleted. Use is restricted to indispensable purposes and industry is adapting its machinery to use home-produced oils.

Official estimates place this year's U. S. production of soy beans at over 200 million bushels. That is twice as much again as our local soy crushing plants can handle, a potential quantity of oil vastly greater than coconuts ever supplied us with. This is machine produced from the word go, whereas copra is a matter of hand labor, and a lot of it, until the filled burlap bags are winched into a steamer's hold.

The coconut palm is peculiar in many ways. In shape it is striking. The trunk has a much greater diameter at the bottom and appears to increase again at the top. With the long slender mid portion the shape is spool-like. This curious palm insists on plenty of air and water and has no objection if the latter is supplied in the form of sea brine. It grows readily sea lapped, provided wave action is not too boisterous. I have seen many self-sown trees situated on living coral reefs.

Many of the smaller Pacific islands are uninhabited. Extensive areas of many of the larger ones are left entirely to nature. Such lonely shores often are jungles of self-sown coconut palms. Occasionally, when the demand for copra is sufficiently strong to make the price attractive, such jungles are harvested. Kanakas, as at home on the sea as dolphins, make their way in dugouts from islet to islet and work the nuts. Hundreds of tons of copra are saved this way, but it is the free lance method — plenty of freedom and hard work but very little pay.

On larger islands, plantations, sometimes white man or company owned but quite often na-

Reprinted by permission from the Pennsylvania Farmer, Pittsburgh, Penna.

tive, occupy favorable locations. In the warm, moist air of tropical sea islands fungi and moulds develop prodigiously. Coconuts tolerate neither, yet must have sun heat and air and plenty of water. Each tree evaporates an enormous quantity while annually producing its nuts. Yield varies greatly. Some trees at times will yield less than a nut a month; others as many as two a week.

It is so easy to bring a coconut plantation into being that many have been started without proper consideration of all factors involved. If really favorably located and free from heavy beetle infestation, palms will persist even when entirely abandoned and quickly seed themselves into a tangle as bad as groves entirely self-established. Rehabilitating such a mess is sometimes a bigger job than starting afresh. It is easier with fire and axe to clear and plant anew.

About the only agricultural implement really necessary once the heavier growth is destroyed is a good solid corn knife. With it growth can be kept down until the palms take over.

Coconut groves must be quite open. Ripe nuts with husks intact are at first buried in a little leaf mould and sand at closer intervals than trees are desired. Ten feet apart is not unusual. Later, every second tree is removed and later still more trees are taken out. By the time the palms are fully grown and 50 to 60 feet tall they will be almost as far apart.

It takes about a year for the rather small white female flower to develop into a fully ripened nut. Once germination starts, however, metamorphosis of nut into thrifty young palm is very rapid. Growth starts at the seed eye in the stem end of the heavily husked nut. Quickly the milk and meat are transformed into a sweet white sponge. A white bud — the plumule — pushes through an eye and penetrates the tough husk. In sunlight it greens and opens leaves. Concurrently the radicle has grown from the other eyes, pierced the husk and rooted in the soil. If there is no soil the roots will force their way into coral rock. Until the baby palm is thus established, roots, trunk and top, shell and husk remain sound. As soon as the process is complete, however, shell and husk rapidly decay, providing nourishment for the seedling.

Within a dozen degrees or so of the equator where conditions favor, coconut seedlings develop amazingly fast. The trunk quickly assumes its odd, spool-like form. When the leafy crown is about a man's height above the ground, flowers open along a branching stalk which develops from a sheath just above the axis of a leaf. Nuts often start forming at the fifth year, but it is usu-

ally the sixth before any mature. From then on a healthy coconut palm will carry all stages, from flower to mature nuts, all through the year.

If pests are under control, rats and crabs in that order, and swine kept up, it is not necessary to perform the arduous task of climbing tall palms to pick nuts intended for copra. When thoroughly mature they drop and may be gathered from the ground.

Gathered nuts are taken to an open, breeze swept space. Jammed on an ironwood spike, the husk is twisted off. The good old corn knife then comes into play. Vigorously wielded by an arm as sturdy as skillful, nuts are quickly chopped into almost equal halves. The liquid is spilled and if weather is right the meat soon shrinks loose from the shell. This meat is collected and further dried. Frequently treatment combines air drying with artificial heat. When wet weather compels oven dessication hot water pipes make the best racks. Such are very expensive, so much copra is reduced in quality by smoke contamination when dried by open fires.

The making of copra from coconut meat is a process made or marred by the worker. Intelligent and diligent persistence is necessary if a high-quality product is to result. Drying must stop at a certain point or weight is unnecessarily lost. It must be carried to that point or the material will spoil. Merely by hefting a scrap of coconut, able workers and buyers alike can tell its exact condition. The cost of producing coconuts is trifling. Turning the meat into copra is where the expense lies. Around 5,500 nuts must be treated individually for each ton.

Except in the case of large plantations little actual money changes hands when bagged copra is sold. A store credit is established which runs through the years, descending from father to son. More often than not with the natives it is a case of debit rather than credit; it is a family affair and lasts as long as any member continues to reside in the neighborhood.

Most Pacific islands were much more thickly populated when whites found them than they are now. There is plenty of visual evidence of this in the form of stone house foundations. Platforms of packed stone on which bamboo and thatch once formed an airy, comfortable habitation. The material resources which supported that population still potentially exist. Copra, desired by whites, enabled the white to sell his wonders at a mighty advantage; swapping one hour's labor, perhaps, for a score.

Milking Machine Sanitation

Condensed from American Agriculturist

Recommended by the Milk Research Council, Inc.

1. *Rinsing and brushing* of milking machines immediately after the last cow has been milked; rinsing and brushing the milking machine parts and pails with clean, cold water, using one 12-quart pailful for each unit.

2. *Disassembling*—Milking machines should be disassembled sufficiently to thoroughly wash and brush with hot water, containing alkali solution, all parts coming in contact with the milk immediately after the rinsing and brushing with clean, cold water process.

3. *Reassemble and rinse* with clean, hot water, using one-half a pail or six to eight quarts, for each unit.

4. *Sterilization.* All milking machine pails and metal and rubber parts coming in contact with the milk must be sterilized by one of the following methods:

(A) Hot water of a minimum temperature of 180° F., using 6 to 8 quarts per unit.

(B) Chemical sterilization—chlorine—200 parts per million.

(C) Lye. Using .04 or slightly less than one-half of one per cent.

The preparation of the lye solution should be as follows: Dissolve one can (13 oz.) of lye into one gallon of water to make the STOCK solution. Then, use one-half teacup, or six ounces, of the above STOCK solution, to one gallon of water. The solution contained in teat cups and milking tubes to be discarded after each use.

Chlorine Sterilization

The proper strength of the chlorine solution should be 200 parts per million and should be prepared according to the direction of the manufacturer. This solution contained in the teat cups and milking machine tubes to be discarded after each use.

5. *Storage.* The use of crocks or earthenware jars for storage of teat cups and milking machine tubes shall be discontinued. Certain types of milking machines do not require storage racks. Dry storage is recommended at all times. However, during the spring, summer and fall months, wet storage (use of solution racks with the proper strength lye or chlorine solution) can be substituted.

Definition: Dry Storage — All parts shall be drained and stored dry in the milkhouse in a sanitary manner.

6. Rinse or flush out the milking machine immediately prior to use.

Reprinted by permission from the American Agriculturist, Ithaca, N. Y., Nov. 21, 1942

Wheat Is Good Feed

Condensed from The Farmer

ALTHOUGH opinion has been somewhat divided as to whether a part of America's surplus of wheat should be sold at 85% of the parity price of corn for feeding livestock, there seems to be no division of opinion as to whether or not it is good livestock feed.

Animal nutritionists at University Farm, St. Paul, have recently issued a pamphlet in which there are wheat rations for beef cattle, dairy cattle, and sheep as well as for poultry and hogs.

Here are the recommendations:

For hogs: One-half cracked wheat and one-half corn with a good protein supplement. When self-fed to little pigs, wheat may be fed whole. When fed to other hogs, either self-fed or hand-fed, it should be cracked because cracking increases wheat's value 15% to 20% for hog feeding. Soaking wheat does not increase its feeding value.

For dairy cows: Wheat is at least equal to corn when the amount is 60% or less of the grain mixture. It should be coarsely ground, and may be fed alone up to 5 or 6 pounds a day, but if more than that amount of grain is fed, wheat should be mixed with other grains. Good dairy rations including wheat are: With plenty of legume hay, 400 pounds of ground wheat and 200 pounds of ground oats, barley or corn. With half legume hay, 400 pounds of ground wheat, 200 pounds of ground oats, barley or corn, and 50 pounds of linseed oilmeal. With no legume hay, 400 pounds of ground wheat, 200 pounds of ground oats, barley, or corn, and 100 pounds of linseed oilmeal or soybean meal.

For fattening cattle: Cracked or coarsely ground wheat may be used up to 50% of the grain ration. Wheat alone lacks palatability and may cause digestive trouble.

For sheep: As a lamb fattening feed wheat has a little less feeding value than corn, but it is equal to good quality barley. Fed as 50% of a mixture with oats, barley or corn, wheat is sufficiently palatable and will produce satisfactory gains. There is no advantage in grinding wheat for lambs. Wheat may compose a half of the grain ration for the ewe flock.

For poultry: Wheat or one of its by-products is included in nearly every poultry ration. It may make up as much as 50% of the grain ration with oats and

Reprinted by permission from The Farmer, S. F. & W., St. Paul, Oct. 3, 1942

yellow corn making up 25% each. It may replace all the middlings and some of the bran in the mash, and it may make up 30% of the entire mash mixture. To make wheat more palatable and to provide phosphorus and bulk some bran should be included in the mash.

Pound for pound wheat is equal to corn in feeding value. It is better in most respects than barley or oats. It contains somewhat more digestible protein than corn, a little less fat, and slightly more carbohydrate. It is definitely higher than corn in energy value. It is also higher in net energy, total digestible nutrients, and carbohydrate than either oats or barley. Its low crude fiber content gives it an advantage in digestibility over barley and more especially over oats.

WHEAT COMPARISONS

The following table shows how the total nutrients of wheat compare to those of the other common grains:

When wheat costs per bu. cents	Shelled corn is worth per bu. cents	Barley is worth per bu. cents	Oats is worth per bu. cents
75	67	55	33
76	68	56	33
77	69	56	34
78	70	57	34
79	71	58	35
80	72	59	35
81	73	59	36
82	73	60	36
83	74	61	37
85	76	62	37

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Beekeeping—By Everett Franklin Phillips, Professor of Apiculture, Cornell University. The Macmillan Co. $4.00.

Breeding Your Own, or Raising Colts for Pleasure and Profit—By Clarence E. Bosworth. The Derrydale Press ($10.00). A book suitable for the breeders of hunters' and saddle horses.

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. The Macmillan Co. $3.90.

Farm Accounting—By Donald R. Mitchell, Asst. Prof. Agri. Economics, Univ. of Wisc. McGraw-Hill Book Co., Inc. (1941). $2.50.

Farm Shop Practice—By Mack M. Jones, M.S., Prof. Agri. Engineering, Univ. of Mo. McGraw-Hill Book Co., Inc. $2.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. The Macmillan Co. $2.90.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing—By V. B. Hart, Ext. Professor of Farm Management; M. C. Bond, Ext. Professor of Marketing; L. C. Cunningham, Ext. Asso. Professor of Farm Management; all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Hunger Signs in Crops—Published by the American Society of Agronomy and The National Fertilizer Association. $2.50.

Home Vegetable Gardening—By Charles S. Nissley, Extension Horticulturist in Vegetable Growing. Rutgers Univ. Press (1942). $1.50.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Judging Handbook—By Julius E. Nordby, Asst. Prof. Animal Husb., Univ. Idaho, and W. Malcolm Beeson, Ph.D., Asst. Prof. Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw-Hill Book Co., Inc. $4.00.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Practical Poultry Management—By James E. Rice, Emeritus Professor of Poultry Husbandry, and Harold E. Botsford, Extension Professor of Poultry Husbandry, both at New York State College of Agriculture. Fourth Edition (1940), John Wiley & Sons, Inc. $2.75.

Practical Horse Breeding and Training — By Jack Widmer. Charles Scribner's Sons (1942). $3.00.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation—By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of the Horse—By George R. Conn, B.S.A.H., D.V.M., Orange Judd Publishing Co., Inc. (1942). $1.50.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

The Western Horse—Its Training, Type and Marketing. By John A. Gorman, Asso. Prof. Animal Production, Univ. of Wyoming. The Interstate Printers and Publishers. $1.65.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

Vegetable Crops—By Homer C. Thompson, Ph.D., Prof. Veg. Crops, Cornell Univ. McGraw-Hill Book Co., Inc. $5.00.

BOOK NOTES

DAIRY SCIENCE—By W. E. Petersen, Ph.D., Associate Professor and Associate Dairy Husbandryman, University of Minnesota. Edited by R. W. Gregory.

In *Dairy Science* the author presents a comprehensive treatment of the field of dairy husbandry. First is a consideration of the historical and economic aspects which encompass and integrate the entire dairy industry. Following this general presentation, the author discusses the origin, development and classification of dairy cattle, systems of breeding, specific problems relating to production, and those having to do with the handling, care, and the processing of milk. This is a book which will be of value to all progressive dairymen.

Publishers: J. B. LIPPINCOTT COMPANY (1939). $4.00.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

INDEX

Beef Cattle

Type as a Factor in Judging ..... Nov., 1941
Wintering the Herd ..... Dec., 1941
Driving Chance Off the Range ..... Jan., 1942
Vitamins for Beef Cattle ..... Jan., 1942
How Permanent Is Type? ..... Mar., 1942
Prevention and Control of Calf Scours, Mar., 1942
Cow Housing Experiment ..... Mar., 1942
Feed Lot Equipment ..... April, 1942
Lower Beef Costs ..... May, 1942
Fitting Steers for Show ..... May, 1942
Why Creep Feed Calves? ..... June, 1942
Figuring the Farm's Beef Power .. July, 1942
Let Performance Be Your Beef Guide, Aug.-Sept., 1942
What War Means to the Cattle Feeder, Oct., 1942
Proving Beef Sires ..... Oct., 1942
Easier Cattle Feeding ..... Nov., 1942
Short-fed Cattle Mean More Profit .. Nov., 1942

Conservation

Hard Work, But No Hard Times .. June, 1941
Undercover Farming ..... June, 1941
Contour Lines ..... July, 1941
Cover Farming ..... Oct., 1941
Power Weed Burner ..... Oct., 1941
The Land and the People ..... Nov., 1941
An Anthology ..... May, 1942
Fence Row Facts ..... June, 1942
Conservation Farming and Yields .. July, 1942
A Piece of Land ..... Aug.-Sept., 1942
Plow Method of Terrace Construction, Oct., 1942
Conserve for Production ..... Nov., 1942

Crops

What About Flax? ..... June, 1941
Corn Sprouts New Wings ..... June, 1941
To Fight Alfalfa Wilt ..... July, 1941
Making Soybean Hay ..... July, 1941
A New Legume-Lotus Corniculatus . Sept., 1941
One Man Looks at One Weed ..... Nov., 1941
Brome Grass ..... Nov., 1941
Piper Velvet Bent ..... Nov., 1941
Little Beans—Big Business ..... Dec., 1941
New System Farmer ..... Dec., 1941
New Control for Corn Ear Worms .. Dec., 1941
High Cotton Yields ..... Jan., 1942
Crop Insurance Dollars ..... Feb., 1942
Cotton Grown to Measure ..... Feb., 1942
Modern Rain Makers ..... April, 1942
Kudzu—Mender of Tattered Lands, April, 1942
Mystery Fiber Produced in Florida . April, 1942
Seed Treatment for Cereals and Corn, May, 1942
Which Forage Crops? ..... June, 1942
Fertilizing Corn ..... June, 1942
More Flax ..... June, 1942
New Crop for the South ..... June, 1942
Sudan Grass ..... June, 1942
Extending the Life of Clover Stands, Aug.-Sept., 1942
Start Alfalfa in August ..... Aug.-Sept., 1942
Bromegrass ..... Nov., 1942

Dairy Cattle

Packers Want Top Veals ..... Jan., 1942
How Much Dairy Grain? ..... Jan., 1942
Trichomoniasis in Dairy Cattle ..... Jan., 1942
Breeding and Feeding Young Stock . Feb., 1942
Dairy Cattle Feeding ..... April, 1942
How Much Rent Can a Cow Pay? . April, 1942
Feeding the Herd Sire ..... May, 1942
Raising Calves When Milk Is Scarce . May, 1942
Rabbit Box Calf Pens ..... May, 1942
Artificial Udder Growth ..... June, 1942
Vitamin C for Sterility ..... June, 1942
Frequency of Milking and Production, June, 1942
Ten Calves per Year from One Cow . July, 1942
Heavier Grain Feeding to Increase Milk, July, 1942
Birth Control in the Cow Barn . Aug.-Sept., 1942
Barn Slaves Revolt ..... Aug.-Sept., 1942
New Methods in Dairy Cattle Feeding, Aug.-Sept., 1942
Experiences in Breeding ..... Aug.-Sept., 1942
Care of Milking Machines ... Aug.-Sept., 1942
Breeding Goats for Winter Milk, Aug.-Sept., 1942
Why Do Cattle Bloat? ..... Aug.-Sept., 1942
White Scours ..... Oct., 1942
Milking Machine Put on Time Schedule, Oct., 1942
Grazing Habits of Cows ..... Oct., 1942
Milk Production of Cows ..... Oct., 1942
The Udder and Mastitis ..... Nov., 1942
Building a Foundation Herd ..... Nov., 1942
Feeding Vitamin A to Dairy Cows .. Nov., 1942
Influence of High Fat Intake ..... Nov., 1942

Farm Machinery

Tractor Costs vs. Horse Costs .... April, 1941
Justifies Mechanization ..... April, 1941
Portable Lumber Harvester ..... Oct., 1941
You Can Ventilate That Stable ..... Jan., 1942
Tooling Up for Soil Conservation .. Jan., 1942
Speed in Farming ..... Jan., 1942
Bale-Chute Saves Labor ..... Jan., 1942
Farm Machinery in 1942 ..... Mar., 1942
The Most from a Gallon of Gas ... Mar., 1942
Push Button Barn Cleaning ..... Mar., 1942
How to Make the Mower Work Better, June, 1942
Device Saves Baling Wire ..... June, 1942
Good Tractor Care ..... June, 1942
New Methods Save Labor in Haying, July, 1942
The Sweep Rake ..... July, 1942
Cutting Labor Corners ..... July, 1942
What Shall I Charge ..... July, 1942
Tractors in Wartime ..... Aug.-Sept., 1942

Fruit

Pruning Peach Trees for Early Production, Feb., 1941
Encouraging Trees to Root Deeply .. Feb., 1941
What Do Apples Cost? ..... March, 1941
4-Leaf Clover System of Pruning . March, 1941
Date Growing ..... April, 1941
The Papaya in Florida ..... May, 1941
Soil Management in Orchards ..... June, 1941
The Carob Tree ..... July, 1941
Growing and Drying Prunes ..... Aug., 1941
New Spray for Apples ..... Dec., 1941
Modifying Biennial Bearing in Apples, Jan., 1942
Planning a Nut Orchard ..... Jan., 1942
Is Your Sprayer Ready ..... Feb., 1942
Economy in Pruning ..... Mar., 1942
Cover Crop Problems in Orchards .. July, 1942

INDEX

Fertilizers

Potash Industry ..... June, 1941
Starter Solutions Modified ..... June, 1941
More about Liquid Fertilizers ..... June, 1941
Putting Plant Food to Work ..... July, 1941
Synthetic Wood Ashes Require Boron, Aug., 1941
A New Fertilizer Development ..... Aug., 1941
Limestone—A Fertilizer ..... Sept., 1941
Hunger Signs in Crops ..... Oct., 1941
Organic Matter ..... Nov., 1941
Calcium-Bearing vs. Neutral Fertilizers, Dec., 1941
It's the Calcium—Not the Alkalinity, Mar., 1942
Fertilizing for Permanent Hay ..... July, 1942
Fertilizers Will Help ..... July, 1942
Lime Becomes Part of Soil ..... Oct., 1942

Hay

Of 13 Ways of Making Hay ..... June, 1942
Hay Cutting Time Vital ..... July, 1942

Hogs

Production Figures ..... Feb., 1942
Handsome Is as Handsome Does ... Feb., 1942
Increasing Pork Production ..... Feb., 1942
Sow Pregnancy Test ..... Mar., 1942
Pork Progress ..... April, 1942
Protein Supplements for Hogs .... April, 1942
Baby Pig Disease ..... May, 1942
Production Testing for Hogs ..... June, 1942
Vitamin B in Swine Nutrition ..... July, 1942
Fitting the Show Herd ..... Aug.-Sept., 1942
Record of Performance for Swine ... Oct., 1942
Make Hogs Heavy for More Profit .. Oct., 1942
Guard Against Soft Pork ..... Oct., 1942
New Hog Cholera Vaccine ..... Nov., 1942
Hogs on Concrete ..... Nov., 1942
Something New in Pigs ..... Nov., 1942

Horses

Horse Sleeping Sickness ..... July, 1941
Breeding Practices in the Remount Service, Jan., 1942
A Cutting Horse Must Be Good ... Mar., 1942
Remount Service Breeding Plan .. April, 1942
Watch Out for It ..... May, 1942
Power of the Horse ..... June, 1942
Wild Horses of the Plains ..... July, 1942
Care of the Brood Mare ..... Aug.-Sept., 1942
Cooperative Selling ..... Aug.-Sept., 1942
Value of Good Roughage for Horses . Oct., 1942

Pastures

How Ranchmen Make their Colts Gentle, Nov., 1941
Horse Breeding in China ..... Nov., 1941
New Pasture Grasses ..... Dec., 1941
Planning the Pasture System ..... Feb., 1942
A Pasture That Does Not Take Annual Leave ..... Feb., 1942
Grass Is Money ..... Feb., 1942
Pasture Champions ..... Mar., 1942
The Search for Better Grass ..... Mar., 1942
Good Pasture Management Pays .. April, 1942
Good Pasture Returns Dividends ... May, 1942
Planning the Use of Pasture .... June, 1942
Combination Legumes for Grazing, Aug.-Sept., 1942
Grass Varieties to Improve Western Range, Oct., 1942

Poultry

Digestion of Poultry ..... Dec., 19
Calling All Farm Flocks ..... Jan., 19
Does Heat for Layers Pay? ..... Feb., 19
Nutritive Requirements of Poultry . Feb., 19
Barbecued Chicken ..... Mar., 19
Poultry Manure Is Worth Money .. Mar., 19
Saving Labor on the Poultry Farm . Mar., 19
Breeding in Step with Feeding .... Mar., 19
Selecting Breeders ..... April, 19
R.O.P. and the Progeny Test ..... April, 19
New Facts on Cannibalism ..... May, 19
Finding Substitutes ..... May, 19
Better Quality Eggs ..... June, 19
Dried Eggs ..... June, 19
Profitable Air Conditioning ..... July, 19
Getting Summer Eggs ..... July, 19
Chickens on Shares ..... July, 19
Sulfur and Charcoal Prevent Coccidiosis, July, 19
How Much Did Those Pullets Cost? Aug.-Sept., 19
Chicks Out-of-Season ..... Aug.-Sept., 19
Store Eggs for Lean Months .. Aug.-Sept., 19
All Out Production from the Pullets . Oct., 19
The Trask Plan ..... Oct., 19
Fall Chicks ..... Nov., 19
Cull Your Hens All the Time ..... Nov., 19
A Boom in Feathers ..... Nov., 19
Finishing Turkeys for Market ..... Nov., 19
A Little More Room, Please ..... Nov., 19
Goose Raising ..... Nov., 19

Sheep

Breeding for Consumers ..... April, 19
Cotton Coats for Sheep ..... June, 19
Quality Spring Lambs ..... July, 19
Ailments of Young Lambs ..... Aug., 19
The Karakul Industry ..... Oct., 19
Sheep and Wool in the West ..... Nov., 19
Lamb Credit per Ewe Weight .... Dec., 19
Box-Type Lamb Brooder ..... Mar., 19
Sheep Production Programs ..... April, 19
Self-feeding of Fattening Lambs .. May, 19
How Much Roughage for Sheep? .. June, 19
A Production Test for Sheep ..... July, 19
Flying Sheepskins ..... Aug.-Sept., 19
Commercial Lamb Feeding ... Aug.-Sept., 19

Silage

Storing Grass Silage ..... Feb., 19
Place of Grass Silage ..... March, 19
Sweet Clover Silage ..... June, 19
New Methods for Grass Silage .... Sept., 19

Vegetables

And a Few Potatoes ..... June, 19
Corn Earworms ..... June, 19
Spray Groups ..... June, 19
Lime Preferences of Plants ..... June, 19
High Quality Celery ..... July, 19
More Lime for Vegetables ..... Dec., 19
Growing Winter Rhubarb ..... Feb., 19
Tenants Share Garden ..... Feb., 19
What's New in Vegetables for 1942 . Mar., 19
How a Champion Grows Tomatoes . April, 19
Fertilizing for Better Vegetables ... May, 19
Should Potatoes Be Planted Thick or Thin? May, 19
Using Blitzkrieg on Weeds .. Aug.-Sept., 19

Dec., 19
Jan., 19
Feb., 19
Feb., 19
Mar., 19
Mar., 19
Mar., 19
Mar., 19
April, 19
April, 19
May, 19
May, 19
June, 19
June, 19
July, 19
July, 19
July, 19
ddiesia
July, 19
et
.-Sept., 19
.-Sept., 19
.-Sept., 19
ta Oct., 19
Oct., 19
Nov., 19
Nov., 19
Nov., 19
Nov., 19
Nov., 19
Nov., 19

April, 19
June, 19
July, 19
Aug., 19
Oct., 19
Nov., 19
Dec., 19
Mar., 19
April, 19
May, 19
June, 19
July, 19
.-Sept., 19
.-Sept., 19

Feb., 19
March, 19
June, 19
Sept., 19

June, 19
June, 19
June, 19
June, 19
July, 19
Dec., 19
Feb., 19
Feb., 19
Mar., 19
April, 19
May, 19
or Thi
May, 19
.-Sept., 19

COMMENTS

"Without a doubt your years of publishing the Farmers Digest have been a wonderful service to the agricultural public."
—*Kentucky*

"A young friend of mine who has been teaching agriculture in our local high school has been called to the service of our country. Wishing to give him something he would enjoy, he asked that we send him the Farmers Digest."—*Illinois*

"I want you to know that I am receiving a liberal agricultural education from your Farmers Digest."—*Pennsylvania*

"Your magazine meets the long-felt need of farmers and busy agricultural workers like myself."—*Arkansas*

"Please also accept my hearty appreciation and thanks for the high quality of your magazine. It is mighty interesting and stimulating."—*Massachusetts*

"We use the Farmers Digest very often in the Agricultural Department, and find it is an up to the minute text book in itself."—*Indiana*

"I consider the Farmers Digest the best all-round farm magazine published in the United States today."—*North Carolina*

"The boys have a waiting list to read the Farmers Digest."
—*Ohio*

"I have received every number of your valuable journal since the first issue in May, 1937, and have appreciated it very much. It is getting better with each issue."—*Tennessee*

"I enjoy your publication and wish every farmer in the state could read the Digest."—*North Carolina*

"I would like to offer sincere congratulations on your publication which will certainly be of interest to us in providing a valuable summary of current farming thought in America."
—*New Zealand*

The Farmers Digest

Presents Each Month Facts about Some Outstanding Agricultural Magazine

Soil Conservation was established in 1935 as the official organ of the Soil Conservation Service, U. S. Department of Agriculture.

Edited by Wellington Brink and published on the first of each month, the magazine brings late news of war production under conservation methods. Packed within 24 pages are articles telling of soil conservation districts, of farmer-agency cooperation, of the practical application of soil-conservation techniques to increase farm yields, profits and soil-safety factors. The subject matter covers a wide range of information of food-for-freedom implications, discusses the adaptation of agricultural lands to emergency needs, reports practical and research developments in erosion control.

Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., 10 cents each, or by subscription at $1 per year, domestic; $1.50 per year, foreign. Postage stamps will not be accepted in payment.

The above is printed for the information of our readers, and as a courtesy to the sources of our information.

The Johnson Press, Ambler, Pa.